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THE SCOPE OF SCHOOL GEOGRAPHY

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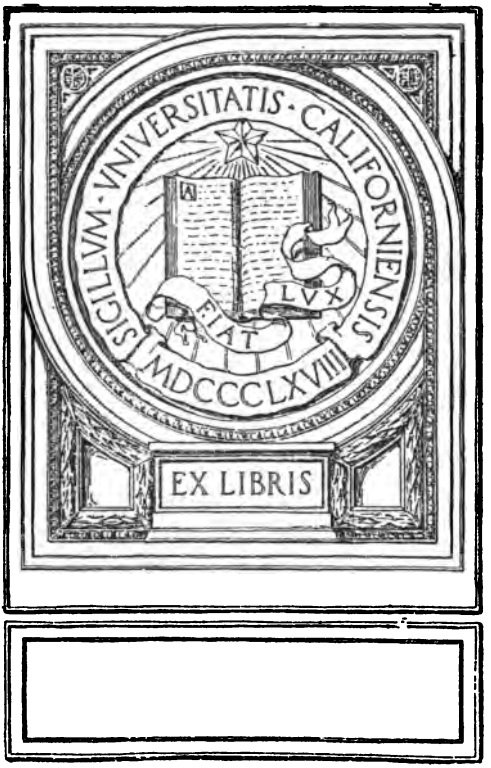
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The Scope of School GEOGRAPHY

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INTRODUCTION

COLLABORATION may have its dangers; but it affords opportunity, of which we have availed ourselves fully, for criticism and argument. Perhaps collaborators feel more free to press their own views than he who merely confers the favour of reading an author's proof. And we may also admit that the subject of the book offers openings for alternative opinions, although we have succeeded in reconciling our own. For geography is a big subject, so big that no man may ever know the whole of it; and we are concerned here not to lay down the boundaries of the whole of it, but only those of an inner circle, to wit, its application to secondary school teaching.

Even though our task goes no farther than that, it is necessary to endeavour to fulfil diverse objects. We have, as we take it, firstly to give some indication of the scope of a geography course which seeks to prepare the pupil merely for safe passage through the school certificate examination, and is severely limited in time to two periods per week. But secondly, we are now emboldened to believe that the school certificate is not the be-all and end-all of geography-teaching in secondary schools. Geography has become, or is rapidly becoming, a well-established university subject. But as soon as the school certificate stage is passed, if not even before, geography announces itself as an elastic subject—one in which the course of study may be deliberately led in this direction or that, whether the physical, or the mathematical, or the economic, or the historical elements be chosen. We deprecate such distortion of the subject

and insistence upon one branch, at least if it connote the exclusion of others, for the main purpose of school geography as we conceive it is to furnish the pupil with some idea of the world beyond his own home place and his holiday resort; above all to foster the geographical outlook. Still more do we wish to ensure that teachers of geography

> . . . do not itch
> To interfere in matters which
> They do not understand.

That is a real danger, so soon as geography reaches the frontier zone between its own content and that of any allied study. It is our concern, therefore, to deal somewhat exhaustively with certain departments of study which are strictly geographical. In doing so, we may appear to set up ideals beyond the attainment of any secondary school curriculum, but we make no apology for that, if by doing so we succeed in informing the teacher of those directions and that value of geographical study which he may indicate, however briefly, to his pupils; even if he have only two periods per week at disposal, even if he have only to inculcate the minimum of fact necessary to cover a syllabus like the following,[1] to be brought within the scope of an examination paper of three hours:

(*a*) Distribution of land and water. Land forms and the agencies modifying them. Configuration and surface characteristics of the Continents. Factors determining climate. Distribution of temperature, winds, rainfall, vegetation, and animal life. Human occupations and activities (social and economic) in relation to these physical conditions.

[1] Joint (Northern) Matriculation Board.

(*b*) To be studied so as to illustrate the subjects stated in section (*a*):

The British Isles.

The rest of the world on broad lines only.

Attention is called to the importance of studying general principles of geography in definite relation to different areas.

(*c*) The reading of ordnance maps and the representation of relief by contoured sketch-maps.

Wherever possible, simple sketch-maps are to be drawn as integral parts of the answers.

Perhaps the most pregnant phrase in the above is 'the rest of the world on broad lines only'.[1] What is treatment 'on broad lines'? Take any country—Mexico for instance (it need not necessarily be a political division, but this one was set for 'geographical description' in a recent school certificate paper). What is there to learn of it 'on broad lines'? Its relief—the central plateau edged by mountains and falling to the coastal lowlands: the consequent variation of climate which falls into the well-known three zones: the consequent zonal vegetation from tropical to temperate: the distribution of rainfall with the resulting arid lands of the north, &c.: the distribution of population—the large towns, excepting the ports, lying high on the plateau:

[1] We doubt the merits of this syllabus, and offer as individual suggestions: (*a*) another area, preferably within the British Empire, accepted for more detailed treatment as an alternative (not in addition) to the British Isles; (*b*) such an area, in addition to the British Isles, but studied in less detail; (*c*) as an alternative to the British Isles and world outlines, the study of contrasted areas, e. g. British Isles or the Mediterranean on the one hand and Australia or South America on the other.

the difficulties of railway construction from lowland to plateau: the indifferent nature of ports on the shallow Gulf coast, to which nevertheless trade is mainly directed: the rich mineral products—silver, oil, &c.: the most characteristic vegetable products—the sisal hemp of Yucatan, the bananas, chewing gum, and so on: the people and some reference to their apparent inability to govern and develop their own territory effectively. Does that summary connote too much detail if the like be applied to the whole world? Certainly, with the two-period week, it would be hard to drive the pupil farther. As certainly, it leaves little room for the study of economic geography as such, physical geography as such, and the rest of the subject considered, so to say, departmentally; nor must we be understood, from our departmental treatment of the subject in subsequent chapters, to suggest that it should.

But that, as we have indicated, is not the whole of the story. There are advanced courses to consider, and there is the fact, which we trust we are justified in assuming, that geography as a secondary school subject is in process of development. It may be regarded as fairly well established as an elementary subject, and as a university subject, but hitherto its position as a secondary school subject has been the weak link in the chain. Therefore, in respect to those of the following chapters in which we treat certain branches of the subject in a style which may appear somewhat exalted, we plead that our object in doing so is to suggest lines of approach which the teacher will find worth bearing in mind if he have the time and opportunity to push on along any or all of them, and may find suggestive even if he be limited to his two periods, and to viewing

the distinction level of the school certificate as the immediate ideal for his pupils.

We are aware that much of the matter which we claim should be taught in school geography does not properly come under the heading of geography. Certain contributions from other studies are borrowed in building up the geographical synthesis, and we dwell on their importance because they are necessary in a geographical training. Geography properly speaking has a definite viewpoint of its own and is not a mosaic of loans from other subjects. Our difficulty lies in the fact that science as taught in schools too often implies no more than the study of physics and chemistry. Biology is occasionally taught, but as a rule from the point of view of the morphologist rather than the evolutionist. The elements of astronomy and meteorology are not taught at all. The simple applications of mathematics to surveying are seldom made clear. The groundwork of geography is physical, and without that groundwork no scientific development of the subject can take place. It would be an ideal condition if the geography master could confine his attention to teaching geography, leaving the elementary science to others. If this were possible, school geography, and incidentally university geography, would take great strides forward.

No reform in the school curriculum could do more to advance the standard of geography than the change in school science recently advocated by Sir R. A. Gregory.[1] Briefly, the suggestion is that up to the age of sixteen all pupils should take a general course in science more or less on the lines of Huxley's *Physiography* or Mill's *Realm of Nature* rather than the elements of chemistry and the

[1] *Nature*, 96 (1915), p. 307, and *School World*, Feb. 1917.

laws of heat, light, and electricity, and that a course of geography would at the same time provide the unifying principle between all aspects of the science course and the teaching in the humanities and history.

If this curriculum were followed, the overburdened subject of geography would be relieved of extraneous matter, and the teaching could be concentrated on regional geography. At the same time, the application of science in human life would have a more vivid interest to the pupils. Incidentally it may be pointed out that the advantages to university geography would be great if it could be assumed that all students on entering the university course had a general acquaintance with physiography or general elementary science, carried up to the age of sixteen. As things are at present, the scientific knowledge of school children lacks balance, and, however good it may be on some sides, is wofully deficient as a basis of geography.

Lastly, it may not be out of place to insist on the necessity of geography teachers being specialists in their subjects if good results are expected. Neither the historian nor the teacher of English has the scientific outlook which is essential, while the science teacher as a rule lacks the synthetic standpoint without which geography loses its meaning. The teaching of geography is no less the work of a specialist than the teaching of chemistry or history. This consideration is all the more important when we bear in mind that after their school days only a few fortunate individuals have the opportunity of pursuing the study farther. If the geographical outlook on the world—which is vital to a true understanding of man and his work—is to be given at all it must be given first at school.

UNIV. OF CALIFORNIA

I

THE EARTH: FORM AND MOVEMENTS

It seems peculiar that there should be divergence of view as to the inclusion, in school geography, of a study of the earth's form and movements. Nevertheless, the matter appears to be in doubt. One certificate syllabus before us prescribes a knowledge of the size, shape, and movements of the earth, and then passes on to the elements of physical geography; a second leads off with the distribution of land and water, and the study of land forms.

The most elementary general geography begins with the information that the earth is a ball, and proceeds to the simple and partial demonstrations of that fact—the disappearing ship, the voyage of circumnavigation, and so on. It introduces the pupil to the globe. It teaches the cardinal points of the compass. It refers to the apparent movements of the sun and the stars, and illustrates by some such analogy as that of a running train that it is really the earth's movement which we observe by means of the heavenly bodies. It gives a first idea of causes of day, night, and the seasons, and other familiar phenomena. By subsequent stages we gain a clear conception of the two movements of the earth: of the day or period of one rotation on its axis; the year or period of one revolution round the sun—they are not easy to retain in the mind without demonstration by means of a model, and not always then. There follow the connexion between rotation and the

determination of position; the north and south poles; the equator; great circles. Some idea must be given of the determination of latitude and longitude. The latitude of any point must be understood as its angular distance from the equator, and an idea may be given, simply, of observations for latitude, as on the pole star in the northern hemisphere. The determination of longitude by means of time observations is generally grasped without much difficulty, although strange superstitions sometimes emerge from the pupil's mind as to the effects of crossing the date-line upon the calendar. The modifications of solar time by means of standard and summer times have an obviously practical application and cannot be omitted. Lastly, we have the consequences of the earth's revolution and the inclination of its axis, with a fuller explanation of the incidence of the seasons. In the minimum course we cannot, perhaps, be too insistent upon a grasp of technical phraseology, but the equinoxes and the solstices are not too alarming terms.

This may be as far as the minimum school course can go. In regard to various phenomena of cosmical physics we are concerned with the effects rather than the causes. We are concerned with certain effects of the tides, as for instance in the British seas. If we explain what the tides are, and that they are due to the attraction exercised by the moon and the sun on the surface waters of the ocean, that should suffice for our part, which does not appear to include the necessity for demonstrating that gravitational attraction is directly proportional to the mass of the attracting body, but inversely proportional to the square of its distance. We have to define

a volcano, because the existence of volcanoes in certain parts of the world is a geographical factor of importance to man; but the exact relationship between vulcanicity and earthquakes is not ours to consider. Terrestrial magnetism we can barely touch; but the difference between true and magnetic north must be realized if the compass and the ordnance map are to be intelligently used.

But it is difficult to see how we can reduce or neglect these minima. They bear definitely on a number of subjects indicated elsewhere in this volume as essential. They give a first conception of the method of fixing points on the map. They bear directly, in respect of climatic conditions, upon the zonal or regional divisions of the world. It is unnecessary to particularize farther. Again, seeing that the most elementary geography lessons begin with the idea that the earth is a spinning ball, and that the facts following from that are certainly not understandable by the elementary pupil sufficiently fully for him to understand their bearings on his secondary work to which we have referred, it appears impossible to pinch out this bud of study in any secondary course. We would rather have him understand these fundamentals than be expected (say) to read a mass of descriptive matter not particularly pertinent to any branch of the subject.

But that is not all. If there be any branch of our minimal studies which is to serve as a guide-post to advanced work, this is one of the most important. It is one of the foundation-stones of the department of cosmical physics. It is essential to any boy whose bent may be toward the mathematical side of geography—

the survey and the map. There may not be many such, but for those who emerge with these interests there is room.

II

THE PHYSICAL BASIS OF GEOGRAPHY

THE object of this chapter is to indicate the extent to which some knowledge of the physical processes by which the surface of the earth has been fashioned ought to be included in a course of school geography. It is with the present rather than with the past conditions of that surface that the geographer is mainly concerned, but inasmuch as the earth as we know it is the result of a long period of evolution, the explanation of its surface features frequently involves an appeal to their past history. So far there is general agreement among geographers. But when we come to consider what is implied in such a statement, we find ground for much diversity of opinion. There are some, for example, who maintain that the study of land forms, except in so far as it throws light on the relations which exist between man and his environment, is outside the scope of the geographer. Others, again, maintain that the study of morphological processes is the necessary basis of all modern geography. At present it is not incumbent upon us to do more than consider the matter from the point of view of the school. The boundaries between geography and the subjects most closely allied to it are not to be regarded as lines in the mathematical sense, but as belts, and sometimes as broad belts. On these belts students of varied interests may find much

in common, and there is no reason why there should be any rigid demarcation of their respective subjects. Geomorphology is a case in point; it deals with many matters common alike to the geographer and to the geologist, and even if its subject-matter and the methods by which it is studied belong to the latter rather than to the former, it is, if not an integral part of geography, at least an essential part of an advanced education in that subject. For school purposes, however, the geography course must be more precisely defined. It is true that many of the physical processes which are gradually modifying the surface of the earth may be made interesting and instructive to youth. On the other hand, it ought to be fully recognized that geography regarded as the study of the interaction between man and his environment is much more important as a training for the citizen than are the problems with which the geologist is accustomed to deal, and most of the time available ought therefore to be devoted to it. Our present task is to show how, as regards school work, the geological contribution which is admittedly necessary may be best limited without detracting from the interest and value of geographical study.

For the further elucidation of our subject the theories regarding geography which have already been indicated must be examined somewhat more closely. According to one theory the subject is concerned not only with description of the surface features of the earth as they now exist, but with the study of the processes through which they have attained their present forms and through which these forms are being modified. The processes involved are largely the result of the action of air and

water and changing temperatures, though other factors, such as volcanic forces and the slow crustal movements, have also to be taken into consideration. As a consequence of the continual interaction between land surfaces, air, and water, all land forms are undergoing a slow process of evolution which may be regarded as the latest chapter in the geological history of the earth. There is here a well-defined subject of study, but one which is only to a slight extent connected with the conditions of life prevailing on the surface of the globe. If, however, as is now generally understood, the first duty of the geographer is to study the earth as the home of man and in relation to man, he will only be indirectly interested in the processes by which the surface of the land has assumed its present form. It is true, of course, that these processes are gradually affecting the human environment, but the changes which they bring about are so gradual that it is only in exceptional cases that we are able to trace their changing influence on human development. There seems little advantage, therefore, in attempting to reconcile the two views of geographical study which have just been indicated. Any attempt to find a place for the expression of both in the school syllabus will lead to a divided interest, a result which in the earlier stages of study ought to be avoided.

It does not follow, however, that the processes modifying the surface of the earth are to be ignored. As a result of their operation in the past they have created conditions which are of vast importance to man. But to understand why these conditions should be important it is often necessary that we should have some explanation of the way in which they originated.

It is impossible, for example, to realize why the Hwang-ho should be 'China's sorrow' if we know nothing of the processes of erosion and deposition, or to explain the distribution of soils in England if we have not heard of a Glacial Period. The argument might be advanced, indeed, that it is impossible for the geographer to say that he will study the development of land forms when and only when the history of this development explains the influence which they exercise on man, since it may be that not until he has studied that development can he say in what ways it affects the human environment. As regards research work this argument is undoubtedly valid, but it need not enter into our consideration of what ought to be taught in schools, where the teacher is presumed to select what he considers necessary for his purpose.

If then we accept the view that the evolution of land forms should be studied with special reference to the influence which they exercise upon man we shall find that the method of treatment is one of the utmost importance. De Martonne, in the introduction of his work, *Traité de Géographie physique*, distinguishes between general geography (*géographie générale*) and regional geography (*géographie régionale*), and indicates his belief that the treatment of the first ought to be explanatory, while that of the second ought to be descriptive. But it is questionable whether the geographical point of view is not lost sight of in such a distinction. To discuss mountains, plains, or river valleys in general terms means that the emphasis must be placed either on their physical or on their human aspects, and as the similarities between mountains are

greater and the differences perhaps more marked on the physical rather than on the human side, it is on the first of these that the emphasis will naturally be placed. In another work De Martonne gives what we consider a much truer interpretation of the geographical point of view. His *La Valachie*, which unfortunately does not seem to be very well known on this side of the Channel, is one of the best regional studies which we have. The physical features of the country are not only described but explained, and both in his description and in his explanation the author appears to have continually under consideration the bearing of the facts with which he is dealing upon the human development of the region. It is from this point of view, therefore, that the geographer ought to develop his subject. He must describe land forms and where necessary explain their evolution, but the study ought to be regional. The pupil at this stage is not concerned, or at least ought not to be, with mountains in the abstract, whether they be regarded as morphological regions or as areas of human development. Needless to say it is not implied that recourse should not be had to the inductive process. After various mountain areas have been studied it is legitimate to classify the methods of mountain formation, and it may even be advisable to do so for the sake of clearness and completeness of view. But what we wish to insist upon is the fact that as we are studying physical features in relation to man it is often necessary to approach them from another point of view than the genetic. As far as the school at least is concerned generalizations regarding physical processes must not be allowed to hold a place of more than secondary importance.

But when all is said it is obvious that frequent reference must be made to the work of the geologist, and it is important to consider how this may best be done. In the first place it can be laid down as a general rule that his technical language should be used as sparingly as possible. Instead of referring to rocks as belonging to this or that geological age it is almost always better to describe them by name as granite, sandstone, chalk, &c., to say whether they are hard or soft, permeable or impermeable, and to mention any other characteristic of a geological nature which they possess. Similarly, when describing scenery the terms employed should be such as will in themselves convey some idea of the physical features of the region under consideration. 'A scarped land' is a geographical expression: 'a typical Jurassic area' is not. Emphasis should be laid on the characteristic topography rather than the age and substance of the land form.

If pupils are to be taught to think of rocks as substances with the appearance and characteristics of which they are more or less familiar, and not merely as substances formed during some remote geological period, it is obvious that something must be said regarding the relationship of rock structures and scenery, and even of the way in which a particular kind of rock formation indicates a particular type of scenery. At first sight this might seem a matter rather for the geologist than for the geographer, but a moment's reflection will serve to show that it is a matter of some consequence to the latter. If the earth is to be regarded as the home of man the scenery of any particular part of it may be considered as indicating the character of that part of

the home, and to understand its character we often need to know something of its development. It is impossible, for example, to study the distribution of population in limestone or in chalk country without knowing something of the action of water upon these particular rocks. The action of the sea upon the land may affect the value of coastal towns and seaports, and the deposition of silt may render unnavigable rivers hitherto navigable. Hence it is necessary that even in the school some of the main facts regarding the building up and wearing down of the land should be taught, always, however, with due regard to the main object in view. Of course there are many matters dealing with surface features of which it is important that pupils should know something but of which a full explanation is impossible. As long as Richthofen's theory of the origin of the loess deposits of China was regarded as satisfactory it was easy and probably wise to explain that loess was a wind-blown deposit from Central Asia. Now that other theories not capable of such easy statement have been advanced, the teacher must content himself with a description of the characteristics and distribution of loess, and with an indication that there is doubt as to the parts played by wind and water respectively in its transportation. Any discussion of the different theories is obviously impossible. Again, the distribution of Boulder Clay in the British Isles is of considerable importance, as it affects to a greater or less extent the distribution and character of the crops in various parts of the country, and there are many occasions on which it will be necessary for the teacher to refer to it. In doing so he cannot avoid saying

something of its origin, but it is obviously impossible for him to discuss the various theories which are held on the subject, and he must content himself with showing that it is a question for the geologists to settle, but one on which they are not yet agreed.

The difficulties are no less great when we come to consider how far we are to explain the evolution of the different types of physical regions with which the geographer has to deal, and probably it will be best to consider each of these types separately, though we cannot hope to do more than indicate the general method of treatment in each case. It has already been suggested that all explanation of the process of mountain formation should be given in connexion with specific areas. The difficulty arises when we seek to define what the proposed explanation should include, and it must frequently seem as if we were trespassing on the ground of the geologist. Is it possible, for example, to compare the geographical form and importance of two such regions as the Andes and the Highlands without making some reference to the fact that the one is a folded range and the other a dissected plateau? Can we describe the Alps with their long slope to the north and their steep fall to the south, or the Himalayas bordered by the plains of the Ganges, without some reference to upfolds and downfolds? What account of a rift-valley is possible which takes no account of its genesis? Whether we wish to distinguish the plain of the Middle Rhine from the Black Forest and the Vosges, by which it is bounded on the east and on the west respectively, or the Central Lowland of Scotland from the Highlands in the north and the Uplands in the south, or Tanganyika in the rift-

valley from Victoria Nyanza on the high plateau, it is surely necessary to say something of the faulting which has so profoundly modified the surface of the regions in question. The human geography of a great part of the north of England is powerfully influenced by the distribution of mountain limestone, millstone grit, and coal-measures, but it is impossible to understand that distribution without some knowledge of the processes of deposition, upheaval, and denudation which have taken place. Miss Semple has shown that the social and economic conditions of the Kentucky Highlanders is largely due to the fact that the region in which they dwell consists of a plateau of horizontal sandstone minutely dissected by the valleys of numerous streams.

It seems obvious, therefore, that some knowledge of the physical processes involved in mountain formation must be imparted to pupils, and the only question is, how much? As already indicated they ought to be not unfamiliar with the idea of great upfolds and downfolds upon the surface of the earth. This idea it was probably easier to explain in days when it was believed that the folding was due to the cooling and consequent contraction of the earth. Recent researches, however, seem to indicate that this explanation is inadequate to account for the facts, and modern theories of isostasy are difficult to reduce to forms which will be sufficiently simple. But, in any case, it is much more important to emphasize that there are folds than it is to discuss how they are caused. Without some knowledge of their existence it is impossible to explain why the same succession of rocks is frequently found on opposite sides

of a mountain range. To take a simple and well-known illustration, the succession of Lower Greensand, Gault, Upper Greensand, and Chalk on either side of the Wealden clay in the south-east of England exercises a very important control over the distribution and economic activities of the inhabitants of that region. But any description of the Weald which fails to take some account of the physical processes involved in its evolution seems to us to be totally lacking in vitality.

As the above illustration also shows, along with the idea of mountain folding must go the idea of mountain denudation. Just as the two processes, in the earlier stages at least, are coincident in point of time, so must they be coincident in point of teaching. In fact the whole cycle of erosion must be explained. It must be shown that every mountain region is gradually worn down until it assumes the form of a plain, or rather of a peneplain, and that such a peneplain may be subsequently raised relatively to the sea. Here again it is unnecessary to discuss what actually happens, whether it is the land that rises or the sea that sinks. All that it is necessary to point out is that there may be a relative change in the level of land and water, and that as a result of that change the land will assume a plateau-like formation upon which the forces of erosion will once more set to work. In a dissected plateau of this description the surface features are often very different from those of a mountain range, and the control which they exercise upon man's activities likewise varies.

Of other ways in which mountains are formed it is not necessary to enter into much detail. Nevertheless, as we have already shown, it is important to describe the

faulting which leads to the formation of rift-valleys, and it is almost impossible to avoid mention of tilting when describing the numerous short ranges of the Great Basin of the United States. Vulcanism is still more important as the soils derived from the disintegration of volcanic rocks are frequently of considerable value to the agriculturist. The large plateaus built up by volcanic action in various parts of the world may also be mentioned in this connexion. But this does not entail a study of the physics of vulcanism or even of the structure of a simple volcano.

There are many facts connected with the physical geography of rivers which must be explained to the pupil before he can obtain an intelligent grasp of the country through which they flow. For example, he learns from his maps that there are numerous places where, as at the Reading Gap between the White Horse and the Chiltern Hills, rivers appear to cut their way through an upland range. The importance of towns like Reading itself makes it necessary to call special attention to such places, and it is obviously impossible to pass by without explanation the rather remarkable physical features which they present. Or, again, take the case of the Niagara River. The complicated history of the falls in relation to the Great Lakes and the events of the Glacial Period is a matter for the geologist and not for the geographer. But the falls themselves, which provide much of the power used over a wide tract of surrounding country, obstruct navigation, and attract each year many thousands of visitors to the town of Niagara, are a factor of no little importance in the human geography of the region. The river, with the

falls and the gorge, must be described, and with that description must go a certain amount of explanation. Even more important from the point of view of human geography are the conditions which lead to the deposition of the silt derived from the degradation of the land. The flood plains and deltas which have been built up in this way have in many cases formed the fertile homes of dense populations; while the silting-up of rivers and harbours has changed the conditions of the human environment even within the historic period. What then is it essential that the pupil should know regarding the work of rivers? In the first place he must have some knowledge of the weathering of the land and of the removal of the débris by surface erosion before he can understand the work done by rivers in wearing away their beds. Many of the facts involved have already become known to him through his own observation, but they require to be interpreted before he can grasp their significance. After erosion comes deposition, and when that has been explained it is possible to distinguish, though not in technical language, the different stages in the life of a river—its youth when it has still to carry to the sea much of the land in its basin lying above base level, its maturity when that task is well advanced, and its old age when its work is all but done. With these different stages many facts of importance in human geography may be correlated. The youthful river is usually of little value for purposes of navigation, but its valley often opens up a route through mountainous country, while its waters are an abundant source of power. A river in old age, on the other hand, may be useful for navigation if its bed has not been impeded

by the deposition of silt; but as its course is generally slow and its fall slight there is seldom much surplus energy available for the use of man. Again, the soil of flood-plains and deltas is often very rich, since being formed by the intermixture of the débris of many different kinds of rock all the constituents of soil fertility are present. When silt is deposited in large quantities the river is raised in its bed and becomes a source of danger to the surrounding country, as is the case with the Hwang-ho. Rivers in old age, too, having ceased to deepen their beds, devote what energy they possess to widening them, and in consequence it is often difficult to find suitable landing-places upon their banks. Many other illustrations might be added, but these will serve for our present purpose.

We have next to consider how far it is necessary to discuss the development of a river system. Here we are on somewhat difficult ground. On the one hand, if we do no more than describe it, pupils may imagine that a river system is a merely fortuitous group of rivers possessing no essential unity. On the other hand, a full explanation is somewhat advanced and not strictly geographical. But on the whole it seems advisable to distinguish between transverse and longitudinal rivers—the terms consequent and subsequent are probably too technical—and to show that the transverse river is the original one which runs indifferently across hard and soft rock, while the longitudinal river is a later development and runs over the relatively softer rocks only. Thus it is possible to show how a scarped land with its alternation of upland and lowland may be developed. The influence of physical conditions upon human

activities in such a region may be clearly brought out. The valleys of the typical scarp-land are often fertile, and are generally under cultivation, while the intervening ranges usually consist of poorer soil and are frequently devoted to pastoral pursuits. Again, a distinction may, in a general way, be drawn between the transverse and the longitudinal river. The former, which runs across upland and lowland, frequently opens up routes to the interior, and towns often grow up at the points where it emerges from the hill country. On the other hand, the longitudinal river running along a belt of softer rocks widens out its valley and often provides considerable tracts of fertile agricultural land. A good illustration of the difference here indicated is to be found in a comparison of the transverse Potomac with its tributary the longitudinal Shenandoah.

Although those aspects of the growth of rivers and of river systems which we have discussed above are the more important from the geographical point of view there are numerous others to which it may be necessary on occasion to call attention. The tendency of rivers to regularize their courses by the removal of waterfalls, lakes, and other breaks in their continuity, the conditions which may lead to the development of underground rivers, and even the apparently more technical matter of rejuvenation, may all have a geographical bearing and may in individual cases require to be dealt with accordingly.

As in the case of mountains and rivers, the geographer looks at coast-lines from another angle than the geologist. The geographer is less concerned with the processes that have formed any given kind of shore than with the effect

of that kind of shore-line on human settlement and trade. Communications with the hinderland and with the sea, and conditions and sites for settlement, are the concern of the geographer, and we would emphasize these aspects of the study even at the expense of the more elementary and physical treatment which after all is largely a legacy from the geological approach to geography. We have to distinguish between those coasts which are easily accessible by reason of deep water inshore and those coasts to which approach is impeded by shoals. This in the first instance proves the contrast between the result of elevation and subsidence. Low rising coasts edged by a smooth unbroken coast-line and faced with shallow waters neither foster seamanship nor encourage fishing. As a rule harbours are few and bad and vessels require to lie at anchor in open roadsteads. Not infrequently lagoons or swamps form a vague, amorphous, and uninhabitable frontier zone between sea and land. Rivers often reach the sea through deltas whose many streams are tortuous, shallow, and unnavigable. On the other hand, the typical drowned coast is much indented by the submersion of river valleys and provided with numerous sheltered harbours, and affords a clear line of junction between water and land. If the coast is high accessibility from the hinderland is often bad, the rivers, beyond their drowned estuaries, being unnavigable. Such a coast encourages discontinuous population to gather on the few stretches of level ground round the inlets and it encourages expansion seawards. To compare these two types of coast effectively, as evidenced (say) on the northern and southern parts of the Atlantic seaboard of the

United States, is impossible without some reference to their physical history. Again, the fjord coast has in one particular case at least led to a well-defined type of human development. But to understand that type it is necessary to have a more accurate impression of the Norwegian fjords than that which was usually obtained from the shipping companies' posters in pre-war days. The shape of the fjords, the delta formations near their heads, and the raised beaches along their shores have all to be taken into consideration, and it is almost impossible to do this without saying something of the causes to which they are probably due. But here we are confronted with a difficulty which illustrates rather effectively the limits within which the geographer ought to work. The origin of fjords is a question for the geologist, but one which he has not yet finally solved. It is not the business of the geographer as such to undertake the task, and he must wait for a final explanation until such times as the geologists are agreed among themselves. Hence the teacher must confine his explanation to a somewhat general statement. Many other illustrations of the necessity of explaining the physical processes which have changed or are changing the form of the coast-line will occur to the reader. In some places, for example, the sea is gaining on the land and in others the land is gaining on the sea, and the changes which are being brought about in this way may be of great importance to man, as witness the attention which is now given to the subject of coast erosion. Even a reference to the white cliffs of Dover may provoke an inquiry from an intelligent pupil.

What then are the facts in the evolution of a coast-

line of which it is important that pupils should know something? In the first place the difference between different types of coast ought to be made clear, and the causes to which each is due ought in a broad and general way to be explained. If this is not done pupils will not hesitate to invent an explanation for themselves. How often, for example, has the examiner come across the statement, gratuitously offered, that the broken character of the west coast of Scotland is due to the heavy waves from the Atlantic? Again, when we compare the coast of Dalmatia, where the mountain folds are parallel to the shore, with the coast of Brittany, where they are at right angles to it; or the coast of Holland, where the land has been built up by the deposition of débris carried down from the interior, with the coast of Cornwall, which has to a great extent been shaped by the waves of the sea; or the coast of Norway, where the controlling factors have been glacial action, faulting, and the depression of the land, with the west coast of peninsular India, which appears to be due to fracturing and subsidence, we find these contrasts are so great that they cannot be ignored. In the second place reference must be made to changes which are actually taking place at the present time. Protective measures against coast erosion and the dredging of natural channels and harbours may be taken as illustrations of the fact that some at least of the physical processes affecting the outline of coasts act with such relative rapidity that they may alter the human environment even within a comparatively short period.

No doubt if time permitted geographical study would profit by the further physiographical treatment of coast-

lines, including the study of wave action, but it is a mistake to dwell on that side of the subject at the expense of the human aspect. A little physiographical knowledge tends to crystallize into mere terms, and the labels are accepted as an end in themselves. We cannot discover much value in that type of teaching which, for instance, leads a pupil to term the Firth of Forth a drowned valley and leave it at that. Such information is not geographical, and unless it is a step in an argument it seems to be worthless.

A knowledge of the processes by which plains have been formed may prove of value in a consideration of the human activities to which they give rise. When a plain has been built up by débris brought down from the surrounding land, that is when it is a plain of accumulation, its soil is often (though not always) of considerable fertility. The Great Plain of China and the Gulf Plains in North America may be taken as illustrations of this fact. But when the plain is formed by the wearing down of an upland region, that is when it is a plain of denudation, it is often much less fertile, since the soils by which it is covered are usually derived from the underlying rock alone. On the other hand, in a plain of denudation the old rocks are being worn down and exposed so that the valuable mineral wealth is likely to be much greater than in the plain of accumulation. Again, in the plains of accumulation the rivers tend to build up their beds and consequently to overflow their banks, while in the plains of denudation they continue to cut down their beds until they reach base level and are therefore often entrenched. Thus the facilities for irrigation may be very different in the two

regions, as the water is much more accessible in the one case than in the other. It is possible, for example, to irrigate much wider areas in the basin of the Ganges than it is in the basin of the Missouri.

Among special types of plain regarding the origin of which it may be advisable to say something are the lacustrine plain and the river plain. Round Winnipeg, for example, the glacial débris deposited on the floor of the glacial Lake Agassiz accounts in no small degree for the fertility of that region at the present day. The flood plains in the basins of the larger rivers are frequently of great importance from the economic point of view. But it is often unnecessary to enter into detail. For example, with regard to plains of accumulation which have been raised above the waters in which they were deposited, it is generally immaterial whether they were built up or faulted up or whether the sea-level has been drawn down so as to leave them dry. The governing factor in each case, however, must be the extent to which the physical evolution of the region has affected human development within it.

To some extent the distribution of lakes may require to be explained. No lessons on the geography of Europe, for example, would be complete if they failed to take notice of the great number of lakes in Finland or on the Baltic ridge. The geographical importance of these lakes may not be very great, but as geographical features they obviously demand notice. Similarly, the radial arrangement of the lakes in our own Lake District is one of great interest and one which the pupil is quite capable of appreciating. Reference should also be made when occasion arises to lakes produced by other pro-

cesses, such as faulting, deposition, and solution. The origin of those which occur in areas of inland drainage is also an important one as the climatic factor has in their case to be taken into consideration. Sometimes also it may be well, as already indicated, to show that lakes are not necessarily permanent features in the topography of a region.

The distinction between continental and oceanic islands is one which must sooner or later be made. In dealing with certain islands such as St. Helena it is important to emphasize the fact of their oceanic origin, just as when dealing with the British Isles it is necessary to say something of their former connexion with the continent. But a distinction of this kind cannot be made without taking into account to some extent the causes to which the formation of islands is due. Some of these causes may best be explained along with the evolution of specific types of coast-line, but in any case the treatment ought to be regional. After all the origin of coral islands is not so important a matter as their distribution and their influence upon man.

Another aspect of our subject is that which deals with the distribution of minerals. To what extent is it possible and desirable to convey to pupils such geological knowledge as will enable them to connect certain geological formations with certain minerals of economic value? In this direction probably little can be done. The matter is really complicated, and any satisfactory statement would presume much more knowledge on the part of the pupil than he is likely to have at command. On the other hand, some elementary facts may quite well be emphasized. It ought to be

made clear, for example, that coal does not occur in rocks of pre-Carboniferous age, while certain other minerals are found abundantly in the older formations. In some districts iron ores are disseminated in crystalline schists to such an extent that they are of great commercial value, as in Scandinavia and in the Lake Superior region. Again, when the sedimentary rock is invaded by a plutonic mass the new minerals which are generated may contain metallic ores in sufficient quantity as to be economically important. It may sometimes be worth while to point out facts such as these, but farther it is unsafe to go.

And lastly, we may note that the distribution of water-supplies is sometimes a matter of importance. It is true that nowadays water is often conveyed a long distance before being used, but in the past the distribution of human settlement even in humid countries such as England was controlled to a great extent by facilities for obtaining water for man and beast. Again, the importance of artesian supplies of water is very great in some parts of the world, as for example in Australia. It may therefore be necessary to say something of the geological conditions which lead to the formation of underground supplies of water, and the means, natural and artificial, by which they may be tapped. In the same way the conditions which lead to the disappearance of the surface water, as in a Karst region, require to be explained.

In the foregoing discussion, which does not claim to be exhaustive, we have endeavoured to show that it is necessary to say something of the physical processes by which the land surface has come to assume its present

form, but at the same time we have sought to limit the extent to which this need be done by insisting that the explanation of physical processes should only be given in connexion with regional geography, and as a general rule only when it tends to throw light upon the relation of man to his environment. If our object had been to make a systematic study of that region of knowledge which lies on the borderland between what is generally regarded to be geological and what is admitted by all to be geographical, we should have adopted other methods. But whatever be the plan followed in university work, it seems essential that in the school, at least, the interest of the pupil should not be unduly distracted by the introduction of matter with but an indefinite bearing on the main subject of study. If this view be sustained, the relations between geology and geography may be stated with tolerable simplicity, as far at least as the school is concerned. The many geological facts to which the teacher of geography has constantly to refer are not matters for systematic and, to a certain extent separate treatment, but are to be regarded as subsidiary to the description of existing land forms and to the influence which they exercise upon human activities. In short, the physical history of a region must not be pursued for its own sake, but must be dropped when it ceases to be of geographical importance, that is, when it ceases to throw light on the relation between man and his environment, which is the true function of the geographer.

III

CLIMATE AND WEATHER

Of all the departments of science with which geography as an educational subject has to do, the study of climate stands in the nearest relationship to it. In certain aspects the study of climate must be part of it. The problem is simply, in what aspects? So far as climate affects man in his geographical aspects, it belongs integrally to geography. So far as the study of climate is concerned with the distribution and characteristics of various types of climate, it belongs integrally to geography. On the other hand, how far it is a function of geography to teach causes to which any particular type of climate is due is debatable, and must presently be debated.

We propose to take the last three sentences as texts in succession, making no apology for discussing briefly the effects of climate on man, obvious as in great measure they are; for the understanding of 'modern' geography connotes a mastery of the obvious. In adopting this succession, we shall be working backward from effect to cause, but again we make no apology, because this order of procedure is appropriate to our argument, and enables us to outline the topics which in connexion with climate are certainly within our scope, before examining those which are not certainly so.

First as regards the effects of climate on man. Man is extremely adaptable: no type of climate is necessarily fatal to him. But the extreme cold of the polar regions, and of mountain-summits and plateaus at elevations

varying according to latitude and other considerations, and the extremity of heat and drought which results in deserts or semi-deserts, are destructive of vegetation and other forms of life on which man depends for sustenance, or at least so strictly limit them that man cannot settle in regions where these conditions exist. Where they do not, man can live permanently, but his means and standard of living, his occupations, are constantly affected, whatever degree of skill he may attain in combating any adverse climatic conditions he may have to face; indeed, his attainment of or failure to attain such skill are two of the fundamental results of climatic control. The Garden of Eden is placed in a land where a sufficiency of means of livelihood was provided by nature for him: the home of earliest man is traced to a tropical land (whether in south-eastern Asia or elsewhere) where he could find food without cultivating it, and where a uniformly warm climate and a rich tree-growth rendered him independent of the need for elaborate (or any) clothing and artificial shelter.

Climate affects man mainly through his environment. The surface of the land on which he moves is affected by climatic conditions; indirectly, it may be; at any rate slowly, but nevertheless materially. With these effects we deal fully elsewhere, but we may summarize them here. 'The "weathering" or wearing away of rocks is due to temperature changes, moisture, and frost; the resulting waste is carried away by moving water, ice, and wind, and may accumulate in various forms.'[1] Taking first very broad illustrations of this statement, we find it possible to define certain regions of the world

[1] Herbertson, *Physiographical Introduction to Geography*, p. 25.

where one particular agent of denudation plays the leading part in weathering and moulding the surface of the land: thus we have (1) regions of water-borne soils wherever rainfall is sufficiently abundant to maintain strong rivers; (2) regions of wind-borne soils wherever the climate is dry, as in hot desert or semi-desert areas; (3) regions which are covered with ice and snow, or have been so covered. This last condition refers to what is usually known as the Ice Age, or the Glacial Epoch, with which great play is made in the study of geography, and rightly, though not always judiciously. Apart from this, we are able to deal with present climatic conditions, and to correlate, to some extent, existing land forms with the great climatic regions which we have presently to discuss. But in dealing with the Ice Age we make our only excursion into the past history of terrestrial climate, and we are in danger of entering a highly controversial field of inquiry, where controversy is no business of ours, but belongs to the geologist primarily, because he holds the visible evidence. We must touch the subject, because 'viewed in relation to man's position on the earth, no geological changes have had a more profound importance than those of the glacial period',[1] and that over areas of first importance to us—north-western Europe, including a large part of our own islands, Canada, and a northern section of the United States. But we should not assert definitely that there was one glacial period, or that there were more than one; just as, while we can point conclusively to the general work of glaciers in the distribution of drift soils, the formation

[1] J. A. Howe, in *Encyclopaedia Britannica*, 11th ed., vol. 12 pp. 56 seqq.

of lakes by damming, &c., we should not definitely assert their agency in certain other directions (such as the sculpturing of fiords and other deep valleys), because we, as geographers, do not handle the evidence, and those who do have not agreed as to their conclusions. (See further, p. 31.)

In certain directions it is possible to specify climatic effects (primary or secondary) upon the surface of the land more minutely than in accordance with broad regional conditions. The different results of the exposure of a coast to a stormy or a quiet sea; the existence of powerful torrents on the rainward slopes of mountains, which tend to behead weaker streams flowing down the drier opposite flanks; the characteristic forms of glaciated valleys, with other results of glacial work like moraines and eskers—such, and many more, are illustrations of effects which may be immediately or ultimately climatic: but generally speaking they are the result of interaction between climatic and other conditions, and they and their bearing upon man's activities are discussed elsewhere (Chap. II).

It is otherwise with vegetation. This again is discussed elsewhere (Chap. IV), but it must be pointed out here that the effects of climate in this connexion are (at least for our purposes) paramount. We say 'for our purposes'; for we must not allow the student to understand that climate is the only factor controlling vegetation. We select this subject, and submit it to the usual process of generalization, because, treated so, it yields valuable indications of the climatic control of conditions under which man lives. We leave the effects of the interaction of climate and soil upon vegetation,

because it is not our own subject, and does not appear to have been brought to that stage of definition at which we can borrow from it. As for this instance of climatic influence upon man, the question for our purpose is again one of interaction. 'It is only indirectly through the food supply that the numbers and modes of life of the inhabitants of any region are regulated by climate. The intermediate agent is vegetation.'[1] Such vegetation may be wild or cultivated: it may supply man's food, or the food of animals whose flesh is eaten by man.

A regional division of the land according to climate and vegetation, expressed in the simplest form, works out as follows: (1) in the highest latitudes, or at the highest elevations, where the temperature is cold, we have cold desert whatever the amount of precipitation may be; (2) in temperate latitudes we have (*a*) with heavy rainfall, temperate forest, (*b*) with light rainfall, grass steppes, (*c*) with little or no rainfall, desert; (3) in hot (tropical) latitudes, we have (*a*) with heavy rainfall, tropical forest, (*b*) with light rainfall, savanna, (*c*) with little or no rainfall, desert. At once we can rule almost—but not quite—wholly out of the sphere of man's activities the divisions (1), (2 *c*), and (3 *c*). On the edge of the arctic cold desert region he may live in a relation to climatic conditions which is one, not of adjustment, but of warfare, and for the most part it is the water, not the land, which supplies his food. On the edge of the warm deserts he may wander in search of pasture for his animals; within them, he may wander from oasis to oasis. His life, in any event, is nomadic, as it is on the drier savannas or steppes.[2]

[1] H. N. Dickson, *Climate and Weather*, p. 201.

[2] It may be observed in passing that we are sometimes rather

The simple climatic and vegetation regions above defined suggest certain accompanying conditions in the distribution of man and his occupations. 'The most sparsely peopled lands are those where there is practically no vegetation, where some fishing and hunting people just manage to exist. Next come the pastoral lands supporting flocks and herds. The inhabitants move about and require a great stretch of land to yield enough food for a family. The dense forests, inhabited by hunting peoples whose women-folk cultivate a little patch of ground, are also sparsely peopled. In the agricultural lands, the density of population increases, the people are settled,' and finally, 'though towns and cities with considerable manufactures and trade have grown up in all rich agricultural lands, the most important of these are found in countries where modern industrial methods are adopted.'[1] Here at last vegetation ceases to appear as a go-between, and climate, along with such other considerations as the presence of minerals, directly affects man's power to establish great industries.

That climate affects agriculture is a point which by

neglectful of the origin of words which we adopt into geographical usage. We sometimes divert them more or less from their original meanings, but their origins may help to fix their present use in the memory. The term *savanna* is adapted, to connote a grass region in a hot climate, from Spanish, derived appropriately from late Latin and Greek words meaning a sheet: we find it first applied in geographical usage by a Spanish writer of the sixteenth century to the central plains of North America at an early period of Spanish acquaintance with them, and with the North American plains we still primarily associate the term. The Russian word *stepi*, meaning waste, gives the origin of the term steppe, and indicates the southern and south-eastern Russian lands as the typical steppe region.

[1] Herbertson, *Physiographical Introduction to Geography*, p. 92.

itself need not be laboured, but the facts which follow from its effects are among the most important which have to be studied in considering climatic control. We need only refer here to the distinctions which accompany the conditions under which the two prime food-crops of the world, wheat and rice, are produced. On the one hand, rice, the prime food-crop of hot lands, yields so heavily from a limited area that it supports a dense sedentary population who consume most of it, and (proportionately to the bulk of the crop) do not export much. They possess a food which grows under the climatic conditions which invest them with sedentary and unprogressive characteristics, the opposite to those of the wheat-eaters. Wheat grows under temperate climatic conditions in which a more complex social order is evolved, when the multitude delegates to the few the task of providing food for all, and where, if a densely peopled land (like our own) cannot or will not produce wheat enough, means can be devised for fetching it from a distance. If a rice crop fail locally, as such a vagary of climate as the 'failure of the monsoon' may cause it to do, the local rice-eater may starve unless the wheat-eater is at hand to help by introducing his methods of long-distance transport. Famine in a country of wheat-eaters is unthinkable, unless under conditions incidental or subsequent to war. A large consideration of geographical factors such as these is worth its place in education, because they explain much that is commonplace, which (by the way) is one of the main functions of geographical teaching.

As for the association between climatic conditions and such occupations as mining and manufacture, we content

ourselves, for the most part, with a few classic examples. Such are the special suitability of the Lancashire climate to cotton-spinning; or the reputed diminution of output from the ironworks of Birmingham, Alabama, as compared with that from works in cooler lands. Again, we have a few stock examples of the conquest of adverse climatic control by man, such as the working of the gold-fields (Kalgoorlie and others) in the arid lands of Western Australia, or that of the ironfields of Gällivara and Kirunavara under the subarctic conditions of northern Sweden.

We have now given indications that climate has direct and indirect effects upon the production of and traffic in vegetable, animal, mineral, and manufactured products. Instances can be largely multiplied: the sum of them has certainly not been collected in geographical text-books, and teacher and student may always be on the look-out for examples within their own knowledge which form illustrations of the doctrines or parallels to the cases given in the books. Such examples can often be found in the locality of the school. They will lead to certain general conclusions. Thus it may be laid down that monotony of climatic conditions, whether in the direction of extreme heat or of extreme cold, or even of a less exacting state such as that enjoyed by the lotus-eaters, makes against progress in social development and civilization; that a moderate but variable climate (like our own) is necessary to enable man to evolve the highest measure of mental and industrial activity. It is pointed out by Miss Semple, in her *Influences of Geographic Environment*, how 'a map of the mean annual isotherms of the earth is eloquent of the

relation between historical development and this one phase of climate. Where the lines run far apart, they enclose extensive areas of similar temperature; and where they approach, they group together regions of contrasted temperatures. The compression of climatic differences into a small area enlivens and accentuates the process of historical development.' The New England States, commanding within relatively short distances from themselves every sort of commercial product from subarctic to tropical, are cited in example. We can readily work out some similar explanation of the political and commercial predominance of Europeans or people of European origin; remembering always never to assign climate (or any other one geographical factor) as the single cause: our watchwords, speaking generally, are, not cause, but causes, and the interaction of causes.

With the psychological effects of climate upon man we need not have much to do. It may be regarded as a 'permissive' topic. It has a certain incidental interest in relation to the subject of the preceding paragraph. It may be tempting to compare the phlegmatic unemotional Briton with the more sensitive and volatile Mediterranean man, or, in the countries of either, the northerner with the southerner, the rough Prussian with the less ungenial Bavarian, and so on. But the subject is delicate, and lends itself too readily to generalizations beyond our scope. The physiological effect of climate is material so far as it is connected with the transplantation of men out of their native climatic environment: it may be pertinent in some instances to inquire exactly what is meant when it is stated that in certain lands men of this or that race 'cannot stand the

climate': for instance, there is opportunity here to exonerate the wet tropical climate from some of the ills which are still charged to it directly, in spite of the progress which has been made in knowledge of the origin of tropical diseases and their geographical distribution. And some little reference in geographical teaching to the problems of acclimatization is desirable, because upon it depends the question (of special importance to pupils studying the British Empire) whether any given country is, or is capable of becoming, a true 'colony' like Canada, or whether it must remain, like India, the home of a native people controlled by a small body of Europeans constantly recruited. In this connexion the problem of 'white Australia' is perhaps the most interesting yet unsolved. We deal further with this topic in Chap. VIII.

We have thus far discussed the first of our three theses: we now take up our second, namely, that 'so far as the study of climate is concerned with the distribution and characteristics of various types of climate, it belongs integrally to geography'.

We are here confronted at once with the disputed question of the value—or perhaps we should rather say the proper place—of the regional method of study. A widely read advanced text-book lays down in its opening sentence that 'in studying the geography of the world it is better to consider the well-marked natural regions which do not change rather than the political divisions which do'. If that sentence were to be interpreted as an exclusive appeal against the study of geography according to political divisions, it might be welcomed at the present moment as offering an escape from the

necessity of mastering new frontiers and the names of new states. But there can be no doubt that it is not so intended. It premises a study of the geography *of the world*: the practical utility of geographical study for most people and most purposes lies ultimately in a study of the geography of some or all of the (political) *countries* of the world. But we shall endeavour presently to show that the two methods of attack are not mutually exclusive; instead, they are complementary, or should be.

The regional distribution of geographical phenomena is capable of expression in various terms, and has been variously expressed. We have already quoted the simplest version (p. 42). We may now, as a basis for discussion, set out a more elaborate version, and it is not inappropriate to choose that laid down by the late Professor A. J. Herbertson. This version has been criticized, but most improvements upon it which have been claimed are no more than adaptations of its principles; such adaptations have not always guarded against over-elaboration; and in any event, Herbertson was the most powerful advocate of regional study. On his basis, the world is regionally divided as follows:

(1) *Polar Types*

1 *a*. *Norway*, highland type. *In Europe:* Norway, excepting the south-west. South-western Iceland. *In N. America:* western Alaska.

1 *b*. *Kamchatka*, highland type. *In Asia:* Kamchatka and adjacent coasts.

1 *c*. *Tundra*, lowland type. The tundra tracts in Northern Europe, Asia, and America.

1 *d*. *Yukon*, highland type. *In Europe:* northern and

eastern Iceland. *In Asia:* north-eastern Siberia. *In N. America:* Yukon basin.

1 *e. Greenland,* highland type. Greenland and other Arctic islands; Antarctica.

Common to all these is a division of the year practically into two seasons—a long hard winter with little or no daylight, and a short summer with almost or quite continuous daylight. The resulting effects in the total absence or close limitation of vegetation, animal life, and human activity are obvious. In the highland types the combination of elevation and high latitude intensifies the severity of the climate. The distinctions between the Norway, Kamchatka, and Yukon highland types are concerned primarily with differences of climatic régime, and as regards practical effects upon other geographical phenomena they are for our purposes negligible. The Greenland or 'ice-cap' type is an extreme example.

'As a rise in elevation involves a fall in temperature, the conditions of the tundra and of the ice-cap are found on the higher slopes of lofty mountains.' [1]

(2) *Cool Temperate Types*

2 *a. Western margin* or West European type. *In Europe:* British Isles, South-western Scandinavia, Denmark, Western Germany, Holland, Belgium, France (except Mediterranean slopes), Northern Spain. *In N. and S. America:* Pacific seaboard (Canada and North-western States, Southern Chile). *In Australasia:* Tasmania, New Zealand (excepting north).

[1] Throughout this summary, free quotations are made from the first section of Herbertson's *Senior Geography.*

Regions of this type are open to oceanic influences from westward. In consequence the climate is never extreme, although in the parts farthest inland, in Europe for example, where the region is merging into 'continental' conditions of climate, the summers become hotter and the winters colder. Rainfall occurs at all seasons, but especially in autumn and winter, and is generally ample, and heavy where mountains face the ocean. Wide expanses of forest are characteristic (but have been largely cleared away in Europe).

2 *b*. *Eastern margin* or St. Lawrence type. *In Asia:* Armenia, Eastern Korea, Northern Japan. *In N. America:* St. Lawrence basin (Eastern Canada and Labrador, south of the tundra, east of the prairies), Newfoundland, United States (north-east and higher Appalachian slopes). *In S. America:* Southern Argentina.

The winters are colder, and the rainfall less plentiful, than in lands of the western marginal type. Such consequences as the more southerly extension of coniferous forests and the freezing of harbours in winter (River St. Lawrence, &c.) will be observed.

2 *c*. *Interior lowlands* or Siberia type. *In Eurasia:* Central lowlands, Poland, European Russia (excepting south) and Western Siberia, with Alpine lands and parts of Germany and Sweden. *In N. America:* northern prairie lands.

Extreme climate ('continental'): hot summer, long hard winters. Rainfall mostly in summer, nowhere heavy, and quite small towards the east of the region in Eurasia and the west of the corresponding region in

North America. Well-marked vegetation zones (see Chap. IV) in conformity. The steppes are the most important geographically.

2 *d*. *Interior highlands* or Altai type. *In Asia:* Altai and adjacent plateau lands. *In N. America:* northern part of western mountain region, in Canada (British Columbia) and North-western States.

2 *e*. *High plateaus* or Tibet type. *In Asia:* Tibet and adjacent mountain lands. *In S. America:* Andean high plateaus and mountain lands in Peru, Bolivia, Chile, &c.

Elevation is the controlling factor in these regions, and climatic conditions vary in accordance with it and with the exposure to or protection from moist or cold winds of the slopes and valleys.

(3) *Warm Temperate Types*

'The warm temperate lands have warmer summers than the cool temperate lands, and warmer winters, except in regions of high elevation or in the interior of continents, where the climate is of the most extreme type, the summers being oppressively hot, the winters bitterly cold. The rainfall varies in amount and season. In the west the rains fall in winter, in the east in summer, while the interior is almost rainless.'

3 *a*. *Western margin* or Mediterranean type. *In Europe, Asia, and N. Africa:* Mediterranean coast lands, including Spain (greater part), with Portugal, France (part); Italy, Yugo-Slavia (Adriatic seaboard), Balkan countries, coast lands of Asia Minor, Syria, and North Africa. *In N.* and

S. America: Pacific seaboard (California, &c., Northern Chile). *In S. Africa:* South-western extremity (Cape of Good Hope). *In Australasia:* the south-west of Western Australia, the south of South Australia, Northern New Zealand.

Warm summers, mild winters, and winter rains. The Mediterranean type is well marked on other counts; its natural conditions are attractive (as a rule) to human settlement, and are exceptionally favourable to a wide range of very valuable vegetable products: the vine, for instance. The parallels between lands of Mediterranean type in various parts of the world are particularly obvious, and to that extent the type is a good one as an introduction to the regional method: but regional study should not (as it rather tends to) stop short at an understanding of this particular region.

3 *b.* *Eastern margin* or China type. *In Asia:* China, Western Korea, and Southern Japan. *In N. America:* United States, approximately Iowa, Missouri, Arkansas, Eastern Texas, and east thereof to the Atlantic, including Gulf Coast. *In S. America:* South-eastern Brazil, &c. *In Africa:* South-eastern coast lands. *In Australasia:* seaboard of New South Wales and Southern Queensland.

The climatic parallels are less effective. The summer is hot and is the principal rainy season. Winters are as a rule cool or cold. But in Southern Japan insular conditions bring in a fairly uniform rainfall throughout the year; and in the parts of Australia and South-east Africa which are assigned to this region the winters are mild.

3 *c*. *Interior lowlands* or Turan type. *In Eurasia:* Turan, Trans-Caspian and Caspian districts; Russian lands in South Europe, Danubian plains (Rumania, Hungary, &c.), Manchuria (part). *In N. America:* West Central States below western mountain region. *In S. America:* Northern Argentina. *In Australasia:* interior parts of New South Wales, Victoria, South Australia (south).

The interior position connotes an extreme climate and scanty rainfall, the driest parts being desert. Typical features are the extent of lands available for stock-raising, and as far as concerns agriculture, the necessity and development of irrigation.

3 *d*. *Plateau* or Iran type. *In Asia:* Iran (interior of Asia Minor, Persia, Baluchistan, &c.). *In America:* interior (arid) lands in South-western States and Mexico. *In S. Africa:* interior (veld) lands.

Climate extreme and dry: fertility only in favoured valleys and on irrigable lands.

3 *e*. *Plateau with cold winters* or Mongolian type. *In Asia:* Mongolia and adjacent lands.

Elevation gives a cooler summer and much colder winters than those of 3 *d*, but otherwise no more favourable conditions. There is no exact parallel, but the Great Basin of North America may be compared.

(4) *and* (5) *Types of Tropical Hot Lands*

'In the tropical lowlands the temperature is high at all seasons, but on the higher parts the climate may be extreme. The range of products is consequently large,

as the products of each belt can be grown at a suitable elevation.'

4 *a*. *Western desert* or Sahara type. Deserts of *N. Africa* (Sahara, Somaliland), *Asia* (Arabia and Syria, North-west India), *N. America* (south-west), *S. America* (central Pacific coast lands in Northern Chile, &c.), *S. Africa* (Kalahari, &c.), *Australasia* (West-central Australia).

All these lie in the track of the trade winds. The bare surface, rapidly heating and cooling, causes a great range of temperature between day and night, and between summer and winter. The incidence of oases and their effects upon human movement and settlement; the occurrence of mineral products of sufficient value to cause men to contest the adverse climatic conditions; the methods by which these are contested—these are points for consideration.

4 *b*. *Monsoon type.* *In Asia:* India (excepting north-west), Burma, Siam, Indo-China, Southern China, Philippine Islands, &c. (Asiatic monsoon lands). *In America:* Central America, Caribbean seaboard (Colombia, Venezuela), West Indies, Brazilian seaboard (part). *In Africa:* Abyssinia (part), Central East African coast lands, Madagascar. *In Australasia:* Queensland and Northern Territory coast lands; Southern New Guinea.

Winds from sea to land in summer, the wet season; winds from land to sea in winter, the dry season. These conditions, as indicated above, occur over lands of wide extent and great variations in relief and other features, which may largely modify the climatic régime. But the

monsoon element in climate is always important, and must not be lost to sight: it is a simple régime, and once understood it gives the clue to the climatic circumstances of any land (whatever its other geographical features may be) where it occurs, whether it be strongly or weakly marked.

4 *c*. *Summer rain type of interior* or Sudan type. *In Asia:* North-west India (Punjab, &c.). *In S. America:* Orinoco basin (except coast lands), and southern interior of Brazil. *In Africa:* Sudan, Upper Zambezi and Congo lands. *In Australia:* interior lands marginal to desert (north and east).

A heavy summer rainfall, with range of temperature varying with elevation, is characteristic. These are the regions identified with the savanna type of vegetation.

4 *d*. *Moderate plateau type* of East Africa. *In Africa:* East African plateau. *In Asia:* highland of South-western Arabia (Yemen).

Cooler and drier than the Sudan type (4 *c*).

4 *e*. *High plateau type* of Ecuador, Colombia, &c. A 'cold land' (*tierra fria*) in tropical latitudes.

5 *a*. *Wet equatorial lowland* or Amazon type. *In Africa:* Congo basin and Guinea coast. *In S. America:* Amazon basin in Northern Brazil, &c., and Guiana coast lands.

Temperature always high; rain at all seasons, with relatively wetter periods twice in the year, at the equinoxes.

5 *b*. *Wet equatorial mountainous islands* or Malay type. *In Asia:* Malay peninsula (south), and greater part of archipelago.

Modifications, as compared with 5 *a*, are introduced by elevation and insular character.

Here, then, is a summary of a regional division of the world, to which we have tacked an approximate typographical definition of each region. It may be of use for reference, but presented in this form it would appal a pupil. Committed to memory in this form it would be worthless. Any such list, and any map of natural regions, give an impression of clear-cut divisions which must be explained away. It is always desirable to insist upon the rarity of a sharp line between one set and another of climatic and kindred phenomena. But even though it be realized that boundaries drawn on a regional and on a political map do not at all convey the same idea, it nevertheless seems clear that knowledge of the locality of the principal countries of the world is a condition precedent to advanced regional study. This point may not appear worth the making: but we have not infrequently encountered examinees who discourse on regions (let us say) of Mediterranean type with a fair knowledge of their characteristics, but none of their locality. This demonstrates the teaching of geography without the teaching of its application, which is its only justification.

Probably no two persons, who set out to make a regional division of the world for themselves, acquainted with the data but not with any previous attempt to review them, would arrive at precisely the same results. But neither the one nor the other (unless the data were mishandled) would necessarily be wrong. That is a compliment to the regional method. It is analytical and

elastic, and it ought to be taught as a method of analysis and an elastic method: it should be understood that the world is, and a particular part of it may be, capable of almost infinite 'regional' division. Under conceivable conditions of climate, relief, and exposure, my back garden may be in a different 'region' from my neighbour's.

In point of fact, since we gave up learning geography by rote, from question and answer, we have taken some sort of regional view from the outset. From the child's first geography lessons we get the impression (at least, it is there if we look for it) that different parts of England have different climatic and kindred conditions, and it may well be that the regional method is best learnt by progress from the particular to the general. We gather, again, at an early stage, that different parts of the world are hot, warm, cool, or cold, wet or dry. But a regional method such as we have summarized, its divisions labelled with type names and numbers and letters (as they must needs be) is an advanced method; it is not an introduction to the subject of geography; and it is not its be-all—it is, indeed, much more nearly its end-all. At any rate, it presents itself to us as the summit, not the base, of a secondary school course. Its value can scarcely be called in question. It opens up broad views, ideas of analysis and comparison, as no other method can.

Let us summarize the knowledge required of the climate of any particular country in an area being studied as a 'special area'—that is to say, more fully than can be demanded for the standard of world-knowledge. Taking an example at hazard, we will consider France. The principal points are as follows: France, except in

the south, is under oceanic influence from westward, for as there is no high land in the west, that influence is felt far inland. Summer is cooler and winter milder than they are farther in the heart of Europe, and the same is true of places on the Atlantic coast, as compared with places in the interior of France itself at similar latitudes. The climate of the north resembles that of our own southern counties. The heat of summer increases toward the centre and south, save at the greater elevations. A few figures of mean temperatures for July and January will illustrate these points. For a similar reason connected with the relief of the land, the west as a whole is not much wetter than the east, if at all, save where the western Pyrenees overlook the sea. A notably high rainfall (an annual average of 60 inches and over) is found here, on some of the higher slopes of the Central Plateau, and on the Vosges mountains. The lowest rainfall (under 20 inches) is on the western part of the Mediterranean coast, under shelter of the Pyrenees. The Mediterranean district of France stands out by itself: it has the Mediterranean régime of a hot, dry summer and a warm winter in which most of the year's rain falls. For the rest, the heaviest rains are in summer in central and south-western France, and in Alsace, while over the rest of the country the rainfall is equally distributed at all seasons. A consideration of the climate of France incidentally calls for some reference to local phenomena such as the cold northerly wind, the mistral, which visits in winter the Rhone valley and the coast to the west of its mouth from the snows of the Alps and the central plateau.

Such, we take it (assuming its methodical presenta-

tion and proper demonstration on the map), is an illustration of the main points for study. It may be observed, with regard to the subject of preceding paragraphs, that as soon as we put these points concerning the climate of France into context (as they should be) with the products, occupations, and so forth, of the land, we find that we have constructed a regional division of it. Moreover, our comparisons with southern England and with interior Europe, and our reference to Mediterranean conditions, are clearly involving us in some larger regional division. This by the way: our purpose is now to inquire what general knowledge of climate is assumed in a statement such as we have outlined about a particular country. We mention oceanic influence: we involve some knowledge of prevalent winds, of the effects of a land surface and a sea surface on temperature, and on rainfall. We mention an increase of summer heat toward the south: we involve some knowledge of the relation between temperature and latitude. We suggest the use of figures: we involve an understanding of what is meant by averages as applied to temperature and rainfall, and how they are arrived at. We assume an understanding of the bearing of elevation upon both temperature and rainfall.

We propose now to summarize the headings which are usually to be found in the chapters on climate in an average text-book on the principles of geography, which aims at the standard with which we are concerned. If we appear to criticize, it will certainly be on the score, not of omission, but of commission. But it may be premised that a geographical text-book, if capable of being read with interest by a pupil (not all text-books

are so, but that is not the fault of the subject), may and probably will contain more or less extraneous matter on climate as on other topics, which is not objectionable if it is interesting (and true); only then it is the teacher's function to pick and insist upon the essential facts.

Beginning with temperature, this is a sensible phenomenon, and thus supplies a groundwork for understanding. Mean temperatures probably deserve clearer explanation than they usually receive, and specific examples are valuable, but they should be absorbed, so to say, as part of the general scheme of temperature distribution, and should not be made a test of memory. Passing to causes, we are told that temperature depends upon (i) latitude, (ii) height of land, (iii) distribution of land and water. The distinction between heat and temperature should be kept clear: a knowledge of the causes of variation of temperature is obligatory, but an explanation of the observed facts in terms of heat is not so, unless the pupils' learning in another department of science enables them to grasp it. The dependence of temperature upon latitude involves understanding of the fact that the sun's rays falling vertically upon the earth's surface have more heating power than those which fall obliquely. The broad fact of the decrease of temperature from the equator to the poles follows. The decrease of temperature with height should be accompanied only by the simplest possible explanation of the acquisition of heat by the air from the heated surface of the earth. The influence of the distribution of land and water upon temperature is demonstrated by some simple illustration of the fact that land acquires and dissipates heat more quickly than water; the consequences of this are not

difficult to grasp. From these points we are led to appreciate the distinction between equable and extreme maritime and continental types of climate. Here we are brought to consider temperature maps. The way in which they are made is interesting but not to be insisted upon; the necessity for reducing temperature to sea-level demands explanation, but it is not the pupil's duty to remember how it is done; it need not disturb us if the pupil does not know the meaning of the word isotherm—though it is a sufficiently convenient term. The essential matter for our purpose is that the lie of the lines and their significance should be known, and therefore the general and seasonal distribution of temperature over the earth's surface. The most difficult requirement in this connexion appears to be the understanding of the movement of the heat equator with the north and south 'movement' of the sun, though it ought to follow readily from an understanding of the seasons (p. 14). At any rate, it is one of the points which must be demonstrated on the map; any written explanation, by itself, is 'stiff'. Its understanding is assisted by the maps of prevalent winds and ocean currents.

The wind map is the easiest of climatic world maps, once it is grasped what is meant by a 'prevalent' wind. In this and in the case of temperature there is something to be said for reference to the local conditions at the moment of the lesson. Thus, if the pupil is learning that at the place where he lives the prevalent wind is south-westerly and the January mean temperature 39° F., and if some such condition prevails at the moment, it may be pointed out as a useful example of the mean; if there is an east wind and a frost, consideration of the compara-

tive rarity of these conditions may be incited. The ideal of systematic meteorological observation in the school is not often attainable, and, after all, the barometer, thermometer, and rain-gauge are not geographical instruments (though if we do not teach their uses probably nobody else will). But if any climatic section in the general geography text-book be shortened for lack of time it must be that on pressure. The corollary to this is that we teach the phenomena of pressure and winds as we find them, and do not seek, any farther than we must, to account for them. The isobar is an object of virtue, but it does not illustrate a sensible phenomenon as the isotherm does; and the whole subject of the behaviour of air over a heated surface or when cooled is one which may be subjected to a clean cut. We say 'may be subjected'; we refrain from saying 'should'. But in view of the limitations upon school time, and for other reasons, we think it worth while to state a case for this 'cut'. We should be clear what it involves: to take a simple example, the position would be that we see which way the wind blows, but not why it does so.

What are the contents of our stock chapter on pressure and winds? We are given, probably, an explanation of atmospheric pressure—the weight of the air—and of the instrument used to measure it, the barometer. We are shown how pressure varies at different temperatures. We are given an explanation of the isobaric chart, and are bidden to compare it with the temperature chart, and to observe the relation between high temperature and low pressure, and vice versa. The necessity of correction for elevation is again pointed out. It is

shown how pressure is affected by the unequal reception and retention of heat by a land and a sea surface, and the result of this as illustrated in the isobaric chart. The cyclone and anticyclone, or the low and the high, are explained, and occasion may be taken to explain also the familiar weather chart—considerably more familiar, by the way, in certain other countries (Australia, for instance) than it is here, through the medium of the daily press. This is a tempting and a practical subject, but it is a side-issue.

Arising out of what has been said above concerning land and sea surfaces, the mechanism of land and sea breezes is indicated, and it is perhaps stated that monsoons are the same phenomenon on a very large scale. We may find a tentative reference to circulation as between the lower and the upper atmosphere, and if we do we had better skip it. For these questions lead on to very delicate ground: there are certain stock examples of the causes of certain climatic phenomena, which are apparently simple and intelligible, and (as has occurred in other departments of geography) have been borrowed and accepted as proven when in point of fact they are not.

If this argument induces the accusation of iconoclastic tendencies, it must be made clear that we are doing no more than stating a case to meet what may be a necessity, that we are warning both teacher and pupil against what may prove to be a pitfall, and that we are far from suggesting that the study of climate may not be pursued much farther as an optional special subject in a geography course in higher education. But the secondary school geography class is not a recruiting-ground for

meteorologists. It is the place to learn of the occurrence and distribution of the sensible phenomena of climate and weather, and of other phenomena of which they are contributory causes, but not necessarily of phenomena which may (or may not) cause them. If occasion arises to show the geography pupil the common instruments of weather observation and how they are used, or incidentally to suggest to him or her the fascination of meteorology as an inexact science, well and good: it is an essential function of geography to generate interest in many matters, which may include allied sciences; but it is not our function to prepare for examination in those sciences.

Let us assume, then, that the chapter on pressure and winds leaves us at least with definite knowledge, which should bear the test of examination, of the whereabouts of the regions of prevalent trade winds (north-east and south-east), south-westerlies, and westerlies, and of prevailing calms, and of monsoons; that we understand the meaning and the limitations of the word 'prevalent', and that we know the normal behaviour of these various régimes, and realize where necessary (as in the case of the Indian monsoons) the abnormal, but do not inquire into the causes of either, unless we can justify them, and find them really essential. For instance, that fine old shibboleth the law of deviation due to the earth's rotation is a geographical law—our own property—and its application to the wind map is too intimate to be ignored. We would not overstate the case for shortening this particular section of our subject: there may be opportunities of giving non-contentious illustrations of the relation between winds, differences of pressure, and

differences of temperature. But the inexactitude of meteorological science is such that there should be no attempt in the school geography lesson to furnish a dogmatic and systematic explanation of pressure and winds.

When we turn to rainfall we are confronted with a physical cause from which we can hardly escape. For unless we know that the air takes up water vapour, to a limited extent, and that the saturation point varies with temperature, we establish no connexion between sea-winds and heavy rainfall, offer no comment on the relatively dry interiors of large land-masses, and give no basis for an understanding of seasonal rainfall, or of the influence of the relief of land upon precipitation. The remarks on a later page (148) concerning temperature maps apply in great part to those showing rainfall.

At this point we anticipate the comment that we have set up an arbitrary standard of knowledge of cause and effect in regard to climate and weather. You are prepared (we may be told) to teach reasons why it is hot or cold, why it rains, but not why the wind blows. We may summarize an answer in this way: that there are reasons for heat or cold which are definite, geographical, and sensible; and that no connexion (as we have shown) can be established between rainfall and the other phenomena without some conception of the cause of precipitation. The subject of pressure, on the other hand, is (so to speak) intangible and for our purpose difficult, and knowledge of atmospheric circulation is inexact and in great part outside our sphere, and we therefore suggest the necessity of dealing with this subject and this knowledge with caution, and within pretty narrow limits.

In summary, we require, first, a knowledge of climatic conditions, viewing those of particular parts of the world before the whole, and we watch at all stages the interaction of climate with other geographical phenomena. The chief types of climate of the world, their distribution, characters, and effects, are usually dealt with to some extent at an elementary stage, but if so they are elaborated and given definition at a later stage, and a regional division of the world according to a scheme of any considerable detail should be made at a late stage in the geography course; not attempted too early. And the same, therefore, applies to any serious consideration of the larger physical operations of climate, together with their physical causes in the limited measure in which we propose to consider them at all.

IV

BIOLOGICAL FACTORS

Vegetation

In assessing the place of botanical knowledge in the study of geography it is essential to distinguish clearly between vegetation and flora. Many writers of textbooks, even in recognizing the importance of plant life in the geographical complex, are not clear as to the use of these words. The two terms are not synonyms as is often hastily assumed. Vegetation is of great importance to the geographer: flora is essentially a botanical study, and in most of its aspects has no geographical bearing.

The vegetation of a region entails a recognition of the general manner of growth of the plants, and their adaptation to the environment. In expressing the response of the plants to conditions of climate and soil vegetation is a physiological study. The flora of a region, on the other hand, embraces an enumeration of the various species of plants and is concerned with their systematic relationships. It is a catalogue of individual species, and floristic studies are essentially morphological. Vegetation studies deal with the general kind of plant life and do not include the name of every species, or strictly speaking of any. Flora takes cognizance of every species, both common and rare, with, if anything, special emphasis on the latter. A flora may or may not contain notes as to mode of growth: they are not an essential part of it.

While a floristic map shows the distribution of individual species over the country-side without any relation to mode of life, a vegetation map shows the kind of plant growth, and since this is dependent on climate and soil expresses distributional facts of great geographical value.

To take an actual example. Coniferous forests are a type of vegetation common in the north of Scotland, Scandinavia, Finland, Arctic Russia, Siberia, Alaska, Canada, and elsewhere. The general appearance of all these forests is the same and their human economy differs little in one place or another. In other words, where coniferous forests reign we recognize that the broad features of the vegetation are the same. Yet the species comprising them differ widely. Spruce and Scots pine in Scotland give place in Siberia to the fir, stone pine

and other species, and in Canada to yellow pine and others. From a geographical standpoint there is no difference between a larch forest in Scotland, the Ural Mountains, or eastern Siberia, or between a beech forest in England or Patagonia, yet in the one case each larch forest is composed of a distinct species and the two beeches are botanically distinct. The hot deserts of Africa and North America exhibit the same general type of scant drought-loving vegetation, but the actual species are widely different in the two continents.

The distinction between vegetation and flora are clearly shown in such works as Hardy's or Schimper's *Plant Geography*, although the latter being written from a botanical standpoint introduces rather many floristic facts. The botanical surveys of Forfarshire, Fifeshire, and the Edinburgh district by Robert Smith are truly geographical: those of his disciples, of certain regions in England, less so.

The considerable advances which have been made in recent years in the study of plants in relation to their environment has led to a classification of vegetations based on habitat. Plants are grouped into communities which in descending order are divided into formations, associations, and societies. Each unit is characterized by certain species or groups of species. This classification may in certain cases be useful in the detailed examination of local geography, but in a general way it is not adapted for geographical purposes. The distinction between a bog-moss moor and a cotton-grass moor cannot be appreciated in their relation to man, to whom both are swampy uplands valuable only for the peat

they may contain. To the geographer there is little difference between different kinds of Fenland.

Some broader if perhaps less scientific division of vegetations is required which can on the one hand express clear differences in physical environment, and on the other hand evokes distinctive responses from man. The recognition of various lands of woodland and grassland is essential, but for world geography at least no terminology need or should be employed that is not more or less familiar. Equatorial and monsoon forests, mediterranean woodlands, deciduous, temperate, and coniferous forests comprise the main type of tree formation that the geographer must notice; savanna, various types of steppe and prairie, meadow, scrub desert, and tundra are the principal grasslands.

The close relation of vegetation to man is generally well recognized in geographical teaching; few text-books omit the major vegetation formations. On the other hand, the correlation of vegetation, whether natural or secondary, with climate and soil is not sufficiently emphasized. By this omission one of the strongest links in the geographical argument is overlooked. These relationships cannot be understood without some attention to the facts of botanical physiology. A pupil who has been taught nature study—that excellent foundation for geography—would have little difficulty in understanding the causal connexion between climate and plant-growth. But failing this elementary training some simple botanical knowledge must be explained. The failure to do so leads to that grave defect in some teaching which is characterized by a false simplication of the subject. No aspect of geography

must be so far simplified as to ignore the essential arguments in the complex. For instance, it is incorrect to suggest, as is often done, that the poleward limit of tree growth is determined alone by temperature. Excessive evaporation due to strong dry winds at a season when owing to frozen ground the plant cannot renew its store of moisture, is probably the determining cause in placing a poleward limit on tree growth. Again, it is necessary in the case of hot deserts or barren steppes to emphasize the connexion between amount of rainfall and temperature, not merely to attempt an explanation of the scanty vegetation by reference to want of rainfall or to high temperature.

The vegetation map, however, has its limitations, which are apt to be lost sight of in the tendency to form generalizations. A forest region does not necessarily give rise to hunting as the predominant occupation even if it does result in a sparse population, one of the essential conditions of a successful hunting community. Hunting is followed only if it is the line of least resistance, and naturally involves the existence of game animals, which as a rule are infrequent in forests. Intensive hunting as a main mode of livelihood in the coniferous forests of the north developed in response to the demand for skins and furs on the part of other communities, and grew with the advance in wealth and leisure of these people. It was not an elemental occupation and does not directly support the hunters.

It must be borne in mind that only the most primitive folk follow the chase as their principal mode of life. Even a slight rise in the scale of progress puts hunting in a position subsidiary to some form or other of

agriculture, however crude in methods and poor in production. We must avoid the groundless assumption that man developed through hunter and shepherd to peasant.

Lastly, the vegetation map must not be interpreted as giving proofs that certain regions in virtue of their climate exclude forms of vegetation that do not occur. In some cases, but not in all, this is so. This kind of map is rather a demonstration that the climatic features characteristic of a particular region favour one type of plant growth at the expense of another, but do not necessarily exclude the latter. Western and Central Europe is shown as a region of forest land, and the map of course fails to show that the climatic balance between grassland and woodland is only slightly in favour of the latter, which therefore readily yields through human intervention to the former. In the main it was only the early inhabitants of Europe who had to contend with a forest environment. A rise in the scale of civilization enabled man to change radically his surroundings and find conditions eminently suitable not for hunting but agriculture.

A vegetation map and a study of natural vegetation emphasize the evergreen woods of the Mediterranean climate and the absence of natural grassland. This affords an explanation of the human economy as regards the place taken by olive, evergreen oak, and orange cultivation, but suggests the impossibility of cereal growth. And yet of all climates the one known as Mediterranean probably presents the best conditions for cereal crops provided only its deficiencies in rainfall are remedied by the help of irrigation. A generalization

applied to crop growth, deduced from the natural vegetation, would be most fallacious.

Limitations of this nature do not lessen the fundamental value of vegetation maps but show that caution is necessary in their interpretation.

The teacher must point out that plant-growth is dependent on certain climatic factors, of which light, moisture, and wind, both in their seasonal and annual distribution, are the most important. Temperature is of considerable though less importance in the sense that high or low temperature in itself does not appear to prevent plant-growth in any part of the globe. In order to understand the bearing of these factors on plant life a broad outline of the physiology of a plant ought to be explained, including the presence and function of root-hairs, the channels in wood and bast and their use, the stomata, and the function of chlorophyll. Without this elementary botanical knowledge it is impossible to avoid lamentably loose and unscientific statements in this part of the geographical synthesis. But we must reluctantly admit that this ideal is beyond attainment in most schools unless the facts are explained in a class of botany or nature study. It is a case, however, of knowledge that would be of use to the teacher even if he has no time nor opportunity to use it in the class. For that reason it should not be overlooked.

While the original vegetation is of importance in a general world survey, and so helps to build the foundation of the subject, secondary vegetation due to man's interference has, as a rule, dispossessed it in most civilized lands. The simple botanical ideas whose importance has been insisted on will be a help in under-

standing the distribution of crops or, in general terms, plants of economic value. But the restriction of cereal crops to grassland climates and timber trees to woodland climates, to take two general examples, does not carry far an explanation of the distribution of economic plants. It is necessary, for instance, to understand that rye can be profitably cultivated on the poorest soils, and that barley has a wider range than oats because it requires a shorter summer for ripening. As geographers we must give due weight to such facts, leaving the botanist to explain the physiological reasons. That slowly ripening maize gives the heaviest yield, that rice requires constant inundation, or that coffee does best when slightly shaded from the sun's rays are facts with geographical bearing, but it is not the geographer's task to seek the reasons. For profitable cultivation a crop must find optimum conditions for that particular part which is of value to man, whether it be fruit, seed, leaf, root, or some other organ. It is not merely a problem of finding the conditions of climate in which the plant can grow and reproduce. Agriculture involves the task of finding the climate and soil which favour growth in a particular direction even to the extent of hypertrophy. Flax is a crop which thrives under a wide range of temperate climate but requires a moist and fairly rich soil. It is either grown for the seed, which produces linseed oil, as in India or the southern United States, or for the stem in which the fibres lie, as in Ulster or Esthonia. Both products cannot be profitably gathered from the same crop since in one case conditions suitable for flowering and fruiting are required, and in the other the opposed function of

vegetative growth must be fostered. Furthermore, the influences which regulate the location of crops are never exclusively and seldom mainly climatic; many other geographical factors have as much if not more importance. The cultivation of wheat is not merely dependent on the requisite supply of moisture, heat, and sunshine at the appropriate seasons. Labour available, price of land, market demands, relations to markets, transport facilities, and other factors enter into the problem. We are not concerned for the moment with these other factors, but insist that the main climatic considerations which affect the distribution of wheat, or any other crop, must be taught even in an elementary course in economic geography. It is not enough to begin with the wheat; its occurrence must be linked to the physical environment. On the plea of the restricted time available it may be argued that this treatment cannot be accorded to all crops of economic value, some of which must merely be mentioned in passing. But the crops of wide importance are so few in number that the objection cannot apply to them. Those of minor importance, especially those grown for other purposes than food, do not merit equal emphasis and can often be judiciously omitted in the earlier stages of geographical study.

In the consideration of plant crops and products of vegetable origin generally the geographer is brought into relation with individual species of plants, but as a rule this does not entail an incursion into botany. There is no necessity to give a crop its scientific name, although the precision of such a label is useful in linking economic geography with agriculture and economic

botany in general. It also avoids the confusion liable to arise through the varying uses of popular names in different lands.

In one respect, however, we have to borrow certain facts from floristic botany even if our loan is confined to more advanced geography. Perhaps one of the more fundamental facts in the distribution of civilizations is the striking absence of cultivable cereals in the New World, and the even more remarkable groups of the chief cereals within some 1,000 miles of Egypt. In its lack of food crops aboriginal Australia suffered great disadvantages, while Africa was comparatively poorly endowed, at any rate south of the Sahara, until Arab and Portuguese introduced useful plants in the train of their slave-raiding. Facts of this order must not be overlooked, but their consideration scarcely entails a study of the means by which plants naturally disperse the species and widen their area of distribution. The migrations which concern the geographer were the work of man.

The distribution of those species that have no immediate relations with man is not part of geography. They are, no doubt, part of man's environment in their contribution to the vegetation as a whole, but not being points of contact are not links in the geographical synthesis.

Animal Life

On the plea that the fauna of a region is part of the environment with which man has to contend a case could, no doubt, be made for the inclusion of animal life in geographical study. The subtle interrelations

of the web of life, as it has been aptly termed, might be held to make an appreciation of the environment incomplete that does not take into account every contributing factor. The answer to that contention is the geographer's insistence on the human aspect as being the aim and end of his studies. It is only where the environment affects man that its consideration is truly geographical. It may be desirable to probe farther the composition of the environment, but it is not essential. The presence of large wild animals nowhere seriously interferes with human settlement. Conspicuous as are the lion and tiger their relation to man is merely incidental. Their presence or absence in any land lacks geographical significance. Such an occurrence as the interference with the building of the Uganda railway by lions attacking the navvies must not be exaggerated to have geographical value.

On the other hand, the original distribution of such herbivorous animals as are capable of domestication has the same fundamental geographical importance as the distribution of primitive cereals. But it is of value in the geography of past rather than of present conditions. The absence of animals suitable for domestication in Australia before its European discovery was undeniably one of the factors in the lowly civilization of the Australian aborigine, but with modern means of transport that lack is now of no significance. The rich endowment of Asia and the near East with animals adaptable to man's service was undoubtedly a factor of great significance in the dispersal of early human stocks from those regions.

The zoogeographical regions of the zoologists have

a faunistic basis. Comparable with the floristic regions of the botanist they are morphological and not physiological and so do not form a part of geographical study. The geographer when he is concerned with animals notes their habits and adaptations to their environment, not their relationship one to another. The reindeer has geographical importance not because it is an ungulate, but because it is adapted for life in the arctic plains and makes human existence possible in the tundra. Whales are of interest to the geographer in their yield of economic products but their classification may well be left to the zoologist. It is of little concern to us that the terrestrial mammals of Australia are marsupials, but that they are scarce, fleet of foot, and of comparatively little value to man is important.

If we could find a formula for animal life embracing the same ideas that vegetation does for plant life it might be useful in expressing the degree of fitness of any region for animal including human life. But that is difficult to obtain owing to the diversity of animal life and the free movement with which most forms are endowed. Moreover, it must not be forgotten that mankind taken as a whole is more vegetarian than carnivorous, the effect of which is to bring him into less close relations with animal than plant life.

In a general way the chief vegetations of the world have their reflection in physiological or adaptive groups of animals. Tundra, forest, steppe, savanna, and tropical jungle show certain adaptations to peculiar conditions of life in the beasts which inhabit them. Many of these peculiarities have a close relationship to human activity. Thus the relation between the thick

winter furs of many polar animals and hunters of the tundra and arctic islands and the Siberian and Canadian forests is a geographical consideration, but the abundant bird life of the north polar summer has little geographical significance. The presence of large mammals in the tropical savannas and their scarcity in tropical forests are facts of geographical value because they bear on the food supply of the inhabitants, but the peculiarities of the native mammalian fauna of Europe have ceased to have any geographical bearing. In short, it is only in those regions where man is directly dependent on the native fauna that its characteristics need be included in our subject.

While the geographer need borrow few facts and fewer ideas from the zoologist as regards the larger land animals he must pay more attention than is generally done to the distribution and habits of certain forms of insect life. The occurrence of various species of mosquito and the tsetse-fly is an essential geographical consideration because of its close relations with human activity. The association between these insects and such diseases as malaria, yellow fever, and sleeping sickness, which, despite all preventive measures, put severe restrictions on the settlement and progress of Europeans, must be borne in mind in a study of more than 50 per cent. of the world's land surface.

The facts of the distribution of fever-carrying insects and of their influence on man and domestic animals, the latter with much bearing on transport in tropical Africa, do not entail a long excursion into zoology, but they do demand the preparation of distributional maps which should be given equal prominence with those of

temperature and rainfall. These are the only faunistic maps which the geographer requires and we would suggest their importance even in school. If, however, the use of such maps involves too great a demand on the teacher's time, the subject at least should not be passed by without some notice.

The methods by which such diseases as malaria, yellow fever, and sleeping sickness are transmitted must be explained in outline, and it is also desirable to indicate the habits of the mosquito sufficiently to explain the success of the means used to destroy them. These facts themselves are not geographical, but they are at the base of a geographical superstructure, and no object is achieved by excluding simple considerations on the ground that they are outside the subject, when their inclusion helps to clarify the argument.

Those are facts which the geographer cannot afford to omit, but their inclusion in his study scarcely lays tribute to zoology and cannot be made to justify the teaching of faunal regions.

The close relations between agricultural and in some cases pastoral activities and bird life are not overlooked when we discourage the teaching of facts concerning the fauna of a country. Such relationships obviously have a place in the exhaustive study of any environment, but not in a more general survey which alone is possible in school work. Again, it is necessary to maintain a sense of proportion. The introduction of the pheasant and the capercailzie to the British Isles may have local significance in the intensive study of a small region as accounting for the maintenance of certain areas as game preserves, but their presence,

although of interest, has no bearing on the general geography of the country. This is an example of the need of purging geography of a tendency to regard it as a depository for odds and ends of entertaining information. Nothing has done more harm to the subject or had greater influence in retarding its acceptance as a serious study.

As regards the distribution of animal life in the sea there is less to be said. While the majority of marine animals enter only casually into the sphere of human activity it is obvious that no geographical studies can be complete that fail to take cognizance of the distribution of commercial fisheries. The term fisheries may be conveniently, if inaccurately, employed to embrace the hunting and collection of all marine organisms from whales to corals. The reasons which regulate the distribution of food fishes and confine their capture on a large scale to the relatively shallow waters of temperate and subpolar seas must be taught, but are not all geographical. They include biological considerations involving mention of the food supply, spawning habits, and physical conditions of fish life. Facts of this nature can be briefly stated and do not call for any depths of biological knowledge, but their importance is twofold. First, they explain the intensive fisheries in many temperate seas in contrast to their insignificance other than purely local in tropical seas; secondly, they furnish strong links between the distribution of man and his organic environment and so introduce important conceptions in the web of life. To trace the causal connexions, if we cite but one instance, between the Labrador current and the French possession of St. Pierre

and Miquelon is surely an exercise in correlation of the greatest value that can easily be explained to children. The productive fisheries of subpolar seas are mainly responsible for drawing and maintaining comparatively dense populations to far northern lands. This is specially the case when those lands are in themselves relatively unproductive—witness the new and abounding prosperity of the dependencies of the Falkland Islands.

These demands do not entail any zoological description of the fishes themselves and rule out of account the fishes of the deep oceans.

Marine invertebrate life need not enter the province of the geographer. It is not his concern to differentiate between the various species of pearl-bearing molluscs that are fished in tropical seas. The occupation of pearling and its products alone are of geographical importance. But here also, and the same applies to corals, some outline of the life conditions of the organisms is desirable, if only to explain their localization on certain coasts.

Marine zoologists and oceanographers recognize certain natural regions in the sea each characterized by special physical conditions which find their reflections in the forms of life that inhabit them. With these physiological faunas the geographer is not concerned, because their distribution has no relation to human activity, and in fact all except the littoral and pelagic faunas are virtually beyond man's reach.

General Biology

The place of general biological doctrines in geographical study is hard to define and raises debatable problems. A grasp of the theory and modal processes of evolution cannot be amiss in any human study, and is certainly all but essential in the higher branches of geography. But it is a subject full of pitfalls for the unwary, and little likely to be understood by a student who lacks all biological training. A little evolutionary knowledge is worse than none in the erroneous interpretations and false conclusions to which it leads. Nothing but harm can result, for instance, from crude and hasty applications of such ideas as the survival of the fittest and the struggle for existence. On the other hand, the conception of a town as an evolving societary group can never be grasped by one who does not understand the doctrine of evolution.

In the following paragraphs we touch briefly on those biological considerations which are essential to the mental equipment of the geography teacher, admitting at the same time that they raise problems too difficult for the average pupil even if lack of time did not prohibit their study.

Problems of emigration, colonization, and acclimatization are intimately bound up with biological considerations, but these are mainly problems that concern a later stage of the subject than school teaching. It is most necessary that the term acclimatization should be 'precised' in meaning—a consideration that applies equally to many other terms borrowed from ordinary English speech in default of specially coined technical

expressions. Acclimatization in the geographical sense must imply not merely the transference of the individual with unimpaired health and activity, but race transference; that is to say, the growth in a new environment of a transported community without lack of health and vigour, or loss of fertility, without the necessity of periodic transference to the original climate or the admixture of new racial strains. Here is a problem that cannot be intelligently studied without a clear understanding of the biological principles involved in variation, modification, and heredity.

The function respectively of nature and nurture in the formation and modification of biological species has much bearing in the higher branches of geographical study. And the tendency of the geographer to overstress the rôle of nurture, that is to say environmental influences, can be held in check only by a full appreciation of the importance of variation and the laws of inheritance. In another chapter we discuss the place that a knowledge of human races and their relationships takes in the geographical complex, but quite apart from racial questions the application of these biological ideas to communities or groups of people cannot be neglected. To take one example only: the vexed question of nationality which is certainly the concern of the geographer cannot be adequately treated without a certain grounding in biological doctrine. Here is one of these complex questions on which many studies shed light but no one alone can fully illuminate. It is a subject which suffers much from one-sided treatment. Nationality is often regarded as a function of race: to the geographer it is much more an expression of environ-

mental conditions, some geographical, others purely economic, and others again of a traditional or spiritual nature. A knowledge of the laws of inheritance steers the geographer clear of the historian's fallacies on the subject and paves the way for a fair estimate of environmental influences.

Again, in the problems relating to the distribution of population it is only the geographer with biological training who will appreciate the part that human gregariousness plays in urban communities. This is an important influence in town geography, in addition to those physical, climatic, and economic factors which are generally recognized, but it is an influence whose effect can be estimated not by a little casual biological teaching but only by a serious student of biology.

In these and other ways a biological training is helpful to the geographer. His study, involving as it does the economics of man, cannot but be helped by a study of other aspects of animal life. But this is a counsel of perfection applicable in any case to advanced geographical studies rather than to school teaching. The present state of school teaching, even when nature study has been part of the curriculum, gives no hope that the more abstract side of biological thought can be introduced in geographical lessons. Even in courses of university standard such a task is met with considerable difficulty. And yet no higher problems in human geography can be satisfactorily studied if the biological outlook is wholly excluded.

V

OCEANOGRAPHY

It has been pointed out by Miss Semple that the highest phase of the adaptation of man to his environment is the transformation of the ocean into a highway. That is one of those obvious truths that tend to be overlooked. In man's earliest days the ocean was a barrier which pent him to the land and forced him to seek land-routes, however devious, in his migrations. Man first conquered the landlocked seas and then with instruments of navigation and stouter vessels ventured on the oceans, fearfully at first, keeping within sight of land; but at length, as confidence grew, crossing the unknown waters in search for lands beyond. The build and growth of his ships is a true measure of man's progress. To-day the oceans knit together their bordering lands to a greater extent than long land-routes can bind far distant countries. The only development that may loosen the links which sea-routes forge is the development of aviation. The aeroplane requires land-routes for the provision of aerodromes, and as a result air-routes follow as far as possible the land connexions between lands. This is to a large extent a reversion to man's early dependence on land connexions in his dispersal.

Enclosed seas have a tendency to unify the lands which lie around them, not so much in race as in culture. We need think only of the Mediterranean with its distinctive civilizations, the Baltic with its predominant Teutonic culture, or the Arab area of the Red Sea.

Considerations such as these call for emphasis of the location, size, and nature of seas and oceans in all stages of geography. This can be achieved only by the use of globes and world maps.

The ordinary school wall-map, designed to show one country or a single continent, for considerations of size, has the smallest possible margin of ocean, and more often than not this margin is coloured a uniform blue, ignoring questions of depth and the associated problems of approach to the land and shallow banks suitable for fisheries. The more modern maps, however, attempt to remedy these defects, and by some oceanic contouring show the oceans not merely as the boundaries of the land, but as an integral part of the surface of the globe. It can be argued that the relief of the ocean floor, as apart from that of the continental shelf, has little relation to human activity unless in the laying of deep-sea cables and the distribution of fishing grounds. Even allowing that the latter consideration hardly calls for time to be devoted to general submarine relief, there is much to be said for the inclusion of the outlines of the subject in school geography. The relief of the globe as a whole cannot be properly grasped without attention to the distribution of submarine relief. Nor do we think that a proportionate place can be attributed to the hydrosphere in relation to the lithosphere if the old conception of the oceans as bottomless abysses is allowed to persist. One of the greatest difficulties in teaching geography is to give a due sense of proportion ; nothing should be omitted that aids in this task. These considerations lie at the base of the broad outlines of physical geography, but it is only specialization on that

plane which calls for a study of the location and nomenclature of all the submarine forms of relief.

It would be an easier task to allocate the contribution of oceanography to geographical studies if there was agreement on the scope of oceanography. The science of the sea covers a wide area and embraces much that is usually treated in physical geography, zoology, and botany. The essential contributions of biology to geography have already been considered, and while we have discussed the place of meteorology it is, perhaps, necessary to consider for a little to what extent ocean currents in their bearing on meteorology find a place in geographical studies. It is a commonplace of climatology that the unequal distribution of land and water is the chief factor in disturbing the symmetrical distribution of solar climate. The process from which this results demands explanation even if it involves an incursion into physics. This matter has been touched on in a previous chapter. The relation of sea to air temperature further involves an account of the distribution of the main currents and drifts.

The teaching of ocean currents stands in much need of reform. It is one of those subjects in which simplification has been pursued without regard to facts. The old Gulf Stream myth dies hard and still persists in over 50 per cent. of text-books. It is not easy to dispel the belief that the Gulf Stream washes the shores of north-western Europe and wanders into the Barents Sea till its branches die off Spitsbergen and Novaya Zemlya. Yet the facts of the case are just as easy to teach. There is no difficulty in understanding that the Gulf Stream as a definite submarine current ends on

the Newfoundland Banks in contact with the cold Labrador current, and that the mixed waters of these two currents cross the Atlantic as a surface drift before the prevailing winds. The surface waters of the eastern North Atlantic are relatively cold, but since they have a fairly equable temperature the prevailing winds that pass over them carry these temperature conditions to the western and north-western margin lands of Europe. The mild equable climate of Western Europe is mainly explained by the prevailing winds, but it is necessary to assign due value to the part played by ocean temperatures, always insisting that if the winds were not generally onshore the effect of the ocean would be small. Examples might be multiplied from other parts of the world with stress on the lack of influence of currents on neighbouring coastal climates where the prevailing winds are offshore.

Currents and drifts on the one hand owe their origin mainly to prevailing winds, and on the other by their effect on air temperature produce certain pressure conditions which result in characteristic winds. They are so intimately associated with winds that their origin cannot, even if it should, be avoided.

Some account of the origin of the main currents does not entail a profound study of the physics of ocean water, and while oceanic circulation is not intelligible without reference to problems of temperature and salinity, geography requires only a passing reference to vertical displacements of water. This is an instance of an arbitrary curtailment of our subject, and the sacrifice of those specialized aspects which can be dispensed with without loss to the main argument. Of course

the low salinity of certain seas, notably the Baltic, having a direct geographical effect in the early freezing of its harbours, requires an explanation, although it is difficult to trace any important relations between the high salinities of certain inland seas and human activity. We cannot say that the peculiarities of the physics of the Black Sea have such geographical importance that they must be insisted on in school work.

A strict adherence to the aim of geography could be held to rule out of account the origin, nature, and distribution of polar ice except in so far as it impedes or blocks trade routes. It is too seldom pointed out that it is the hindrance of sea-ice which prevents a short route to the Pacific and necessitates the long routes via Suez or Panama. Familiarity with the Mercator map and lack of familiarity with the globe make many people flat-earth adherents in all but theory. They fail to realize in consequence the real impediment that polar ice affords to ocean routes.

Even if we admit polar ice to school geography only in this respect we encounter it in many seas of the globe. North Atlantic, Hudson Bay, Baltic, White, and Kara Seas, Drake Strait, and Bering Strait are all regions in which polar ice may be or normally is encountered, while the departure of the Southern Ocean sailing-ship routes from great circle courses is due to the same occurrence. It is not possible to accept a geographical factor of this importance without some explanation of its origin even if only to differentiate between smaller sea-ice and larger icebergs. Trade-route maps should be supplemented by two on a polar projection, one for each hemisphere, showing the extent

of permanently and periodically navigable waters and the danger areas due to polar ice.

One branch of oceanography can be entirely omitted in school geography. The nature and origin of deep-sea deposits are too far removed from any relation to man to merit a place in school work. Their introduction adds a needless burden to the pupil's load, and since in the main they lack correlation with other geographical factors their omission leaves no gap.

One difficulty in the introduction of oceanographical facts must be noted. That is the unfamiliar ideas which they necessarily introduce to pupils who at best are familiar only with the sea beach, and to whom, as to their ancestors, the sea is a barrier. For this reason we are convinced that great care should be taken in introducing such matter and that it should be kept within strict bounds. In another chapter we have given reasons for the omission of most aspects of marine biology from school geography.

Even if we admit the study of physical origins of coastal features there is still much diversity of opinion regarding the place of submarine coastal features in school geography.

The recognition that a land mass does not end with the present shore-line involves a consideration of the extent and possibly the origin of the continental shelf. The importance of this shelf with regard to fisheries is emphasized later. The distribution of islands and archipelagoes in close proximity to continental shores is easily understood if the extent of the shelf is shown on the map, while in a featureless ocean it remains a mystery. This may be said to necessitate an explana-

tion of the origin of the shelf, but it need not call for an explanation of wave action on rocks of different kinds and various bedding.

The submarine as well as the land contours of the ria and fjord show characteristic differences which have distinctive geographical value. That there is no unanimity of opinion as to the origin of fjords matters little to the geographer; the actual features of the fjord are his chief concern, as we have indicated already (pp. 31, 41).

After all, we have to take our stand upon a compromise, admitting that physical analysis of these features is desirable to the extent of explaining their salient phenomena, that a deeper study of physical origins must be left to the physiographer, and that much physiographical knowledge is useful but not essential to geography.

Another aspect of coastal waters which receives too little attention is their relation to the utility of inlets as seaports. It should be explained that most seaports date from the days of small sailing vessels, which were and are more exigent in their demands than vessels carrying their own power of propulsion. A sailing vessel cannot rely on making use of a port which has a narrow channel from the sea, since adverse winds may make the navigation of such a channel impossible. For safe anchorage the vessel requires twenty to thirty, and not over sixty, feet of water, a soft muddy bottom to hold the anchor, and shelter from the wind in as many directions as possible. A full-powered steamer can successfully negotiate a narrow channel, anchor in deeper water, and if necessary lie at anchor with little

or no shelter except from direct wave action. Increase in the size of vessels tends to the concentration of trade in the larger and deeper ports and the virtual abandonment of the smaller ports. The reasons which lead to such changes are no doubt partly related to problems of land transport and distribution, but they have a physical basis.

VI

GEOGRAPHY IN ITS ECONOMIC ASPECTS

GEOGRAPHY in its economic as in its other aspects has to draw upon various cognate subjects, the most important of which are geology, botany, and agriculture, applied science, history, and economics, and it is worth while to consider briefly the relation in which it stands to these. Let us take as our first illustration the great change which occurred in the distribution of the iron and steel industry throughout the world during the latter half of the nineteenth century. One of the most striking features of this change was the rapid development of the German industry consequent upon the discovery and application of the 'basic process' of smelting iron ore. To understand what took place, however, we must, on the one hand, have some knowledge of the geographical distribution of the iron ores of Europe, and on the other some slight acquaintance with the methods pursued in the manufacture of iron and steel. For the first we turn to the geologist and for the second to the metallurgist. It is the business of the geographer to correlate these facts with various others, such as the distribution of fuel and the facilities for export and

import in such a way as to explain the rapid growth of the manufacture of iron and steel in Germany. Or, again, if we desire to consider the distribution of the wheat-growing areas of the world and the possibility of their extension it is necessary that we should know something of the soils and climates in which wheat will thrive and ripen. For this information we have to turn to the agricultural expert, and we correlate what he tells us with various other factors affecting the commercial cultivation of wheat, in order to obtain a reasoned explanation of its distribution at the present time, and of the possibilities of its extension.

The relations of economic geography to history and economics are in some respects not quite as close as those to geology or agriculture. The facts with which history has to deal do not enter into the geographical synthesis, but they may cast much light upon it. The union of the Parliaments of England and Scotland in 1707 in no way altered the geographical conditions which prevailed in the latter country or affected its place relations with other parts of the world, yet we are unable to understand the economic development of Scotland in the eighteenth and nineteenth centuries without some knowledge of the consequences of that event. Again, for long it will be impossible to discuss the economic geography of almost any part of Europe without taking into consideration the changes in political conditions which have been brought about by the Great War. Manufacturing centres, routes, and ports of pre-war days will in many cases contend with manufacturing centres, routes, and ports of post-war days, and in the struggle there will be many oppor-

tunities of watching the effect of geographical controls. But the change in political conditions, that is, the historic aspect, will constantly have to be kept in mind.

With regard to economics the position is somewhat different. It is the work of the geographer to provide much of the material with which the well-equipped economist has to deal, and that subject is therefore rather beyond the scope of ordinary school work. Nevertheless, the economic aspect cannot be altogether ignored. A high tariff may prove an even greater obstacle to commerce than a mountain range, and a country may, with the aid of bounties, develop an industry for which by nature it is not particularly suited. The economic soundness of tariffs and bounties is obviously not a matter for discussion, but their results upon economic development may have to be considered.

We have next to consider the method by which economic geography may best be studied. A regional survey is the one most usually adopted, and for school work, at least, it seems capable of giving the most satisfactory results. To consider the agriculture of the world, its mineral resources, its manufactures, and its trade routes in succession, as is done in one well-known work, has many advantages for the more advanced student, but it is doubtful whether it is the method by which the subject should in the first instance be approached, as it involves a certain power of generalization for which the beginner has not the requisite training. Even a regional survey, however, may take one of several forms. Undoubtedly, the most attractive at first sight is that which disregards all political boundaries and

considers the various divisions of the land surface from a purely geographical point of view. The great objection to this method, of course, is that it may fail to take into account variations in the economic output of different parts of the same geographical region as a result of differences in the political and social organization of the inhabitants.

The idea of the natural region is nevertheless one of great value in the study of economic geography, and it is well to consider what use can be made of it. In the first place, it may be noted, the division of the world into its major natural regions according to some such scheme as that of the late Professor Herbertson affords a means by which the economic geography of the world can be studied in broad outline. Characteristic crops and characteristic occupations can be correlated with certain types of geographical regions. The olive and citrus fruits are typical of the countries with a Mediterranean climate, rice is one of the chief products of the monsoon areas, the great steppe lands of America and Asia are devoted to pastoral pursuits. On the other hand, such a method of study would not help us to any extent in the study of Western Europe or of the east of the United States, where the human response to geographical control is much more complex. In the second place, however, we may observe that the idea of natural regions can with advantage be used in the more detailed study of specified areas. The larger political units can be subdivided after a consideration of their form and structure, climate, vegetation, and place relations, into a number of regions in each of which there is a well-defined relationship between the geographical factors

which constitute the region on the one hand and the economic activities of its inhabitants on the other. By this method of treatment the geographical point of view is well maintained throughout, an undoubted advantage in this branch of geography, where there is a tendency to stray into questions of applied economics. But, it must be remembered, the economic geography of a country as a whole is more than the sum of the economic geographies of the different regions of which it is formed. We might, for example, treat every region of the British Isles in detail and yet miss some of the more important geographical considerations which have contributed to the economic growth of the country. It is necessary, therefore, in a detailed survey of any political unit, to consider not only the various natural regions of which it is composed and their relations one to another, but also how economic development and place relations of the country as a whole have affected its international position.

But whatever method be adopted there are several matters upon which a word of warning may be uttered. In the first place, the teacher ought to beware lest in his enthusiasm for the application of geographical principles he leads his pupils into the belief that man is a creature of his environment and that his actions are absolutely determined by it. The geographical environment offers opportunities of which man may or may not take advantage, presents difficulties which he may or may not endeavour to overcome. It does not determine his life, but it exercises a certain control over his activities. Formal teaching on this point is probably unnecessary, but it is desirable that pupils should be guarded against

misconceptions, more especially in view of the second matter to which we desire to draw attention. The action of geographical forces in any region is not constant, but varies with variations in the standard of knowledge and civilization of its inhabitants, and, it may be, with variations in the standard of knowledge and civilization of the world as a whole. This aspect of the subject may best be brought out in connexion with the economic history of the region which is under consideration. Before the discovery of the Cape route to India and of North and South America the British Isles occupied a relatively inferior position for trade with the rest of the world as far as it was then known. After these discoveries, however, their position in the land hemisphere was central rather than peripheral, and by taking advantage of that fact their inhabitants were able to build up the world-wide trade and commerce which they now possess. Again, the type of economic development which prevailed in the prairie lands of North America when their only inhabitants were the so-called American Indians is very different from that which prevails to-day under a people of European origin.

In this connexion we may perhaps draw attention to a difficulty which is a frequent source of trouble to the teacher of geography, more especially in the school. In examining the changes which have taken place in the importance of any region as the result of a change of conditions similar to those indicated above, or for the matter of that in comparing the relative importance of any two regions, what methods of measurement are we to adopt? It is very common to see in the text-books,

for example, statements to the effect that the trade of a certain place has increased greatly for some reason or other, without any indication being given of the extent to which it has increased; or the iron and steel industry of Britain, the United States, and Germany may all be described as 'very large' and yet nothing may be said of their relative importance. Now it is far from our intention to suggest that statistical information should be imparted to pupils, much less that they should be expected to commit such information to memory. But the advantages of the statistical method need not necessarily be lost sight of. It is surely better to say, for example, that London does nearly one-half of the entrepôt trade of Great Britain and Liverpool nearly one-fourth, than it is to say that each of them is largely engaged in it; a better idea is given of the Yorks., Derby, and Notts. coalfield by saying that its annual production is about one-fourth of that of the United Kingdom than by merely saying that it is the most important, and no undue strain is placed upon the memory of the pupil. To the well-informed teacher, many illustrations of this method will readily occur which if not pushed to extremes will tend to make the subject more realistic.

But whatever be the methods which are adopted in teaching economic geography, the subject-matter is more or less the same. In it, agriculture ought to come first, not only because all mankind is ultimately dependent upon it, but because in one form or another it gives employment to a larger proportion of the world's population than any other industry. For its treatment a necessary presupposition of course is that the pupils

should have some knowledge of the physical features and climate of the region or regions under consideration. But difficulties at once arise when we seek to advance beyond that point. First of all, how far ought we to describe the types of soil and climate suitable for the growth of particular plants? It seems obvious that something must be said on this part of the subject, and equally obvious that what is said must be within the comprehension of the pupils. Hence only the general characteristics of particular soils can be referred to—for example, it may be pointed out that those derived from crystalline rocks are usually poor in the constituents necessary for plant growth, that sandy soils retain moisture with difficulty, and that those derived from volcanic outpourings are often possessed of great fertility. Facts of this description it will, as a rule, be possible to connect with the structure and physical history of the area which is being surveyed. On the other hand, it is practically impossible to enter into any discussion of the reasons why certain soils should possess a greater degree of fertility than others or be more suitable for particular crops. This is a matter for the agricultural chemist rather than for the geographer, and the results of his work can only be indicated in very general terms. Even with regard to statements concerning the fertility or infertility of certain types of soil a considerable degree of caution must be observed lest the pupil be tempted into hasty generalization on his own account. It is not the case, for example, that all volcanic soils are fertile; glacial deposits vary greatly in different regions or in different parts of the same region as regards their suitability for cultivation; alluvial

plains may consist of light sands or of heavy clays. As a general rule, therefore, it will be better for the teacher to confine himself to descriptive accounts of the soil with special reference to its fertility or infertility rather than for him to enter into any explanation of the facts in question.

Again, the pupil must be taught a certain amount regarding the climatic requirements of the more important economic plants. Of the general conditions controlling the distribution of the different types of woodland, grassland, and desert he may be presumed to know something already, and it may be well to correlate each of these types with one or more of its products which are useful to man. But as a general rule economic plants have extended far beyond the limits within which they were originally indigenous, and it is necessary that something should be said regarding the climatic conditions which control their distribution at the present time or which may conceivably control it in the future. But whatever is said should have a direct bearing upon geographical distribution. It should enable the pupil to understand, for example, the distribution of wheat, maize, and cotton in North America, the growth of certain fruits in regions with a Mediterranean type of climate, the reasons, as far as they are geographical, for the cultivation of rice in the monsoon countries of Asia. It need not, however, explain the effects of climatic conditions upon the various functions of plant life. The fact that the longer duration of sunlight in high latitudes compensates for a lower temperature as far as the ripening of wheat is concerned is a matter of geographical importance; the

reason why this should be so is for the botanist and not for the geographer to explain.

But in the treatment of economic geography the economic factor is never very far distant, and reference to it must constantly be made. The area under any particular crop does not necessarily coincide with the area within which that crop may be grown. The large extension of the wheat lands of Great Britain during the war may be taken as proof of the fact that there are many parts of the country in which, while they are not climatically unsuitable, it is in normal times economically unprofitable to cultivate wheat. In other parts of the world we find the economic factor tending to carry the cultivation of wheat either up to, or beyond, the limits which appear to be fixed by nature. No better illustration of this can be found than in the story of the development of early ripening wheats—more especially Marquis wheat—in Canada. As a result of the progress which has been made in this respect heavy losses through frost have been avoided in the more settled parts of that country, while cultivation has been extended into districts which have hitherto been deemed too far north for the growth of wheat. Even in those regions where wheat is but a marginal crop it is the economic, and not the climatic, factor which determines the backward and forward movement of its northern limit.

Again, it may happen that for economic reasons the cultivation of certain crops is unprofitable in the region in which they are indigenous, and is transferred in whole or in part to others. For a number of years the greater part of the world's supply of rubber came from various tropical plants, and more especially from those in the

basins of the Amazon and the Congo. The plants from which the rubber was obtained, however, do not grow in close formation in these regions, but are scattered throughout the forests. Their exploitation, therefore, became increasingly difficult, especially as those plants in the more accessible districts were often recklessly destroyed in the desire to obtain as large an immediate output as possible, and it became necessary to consider the question of cultivation. The populations of the regions which have been mentioned, however, were neither sufficiently large nor sufficiently skilled to warrant any great outlay. On the other hand, the equatorial margin of the monsoon region had climatic conditions which appeared suitable for the growth of various rubber trees, and more especially *Hevea brasiliensis*, and they were in the immediate neighbourhood of an unlimited supply of cheap and, from the agricultural point of view, fairly skilled labour. It is, therefore, in places such as Ceylon, the Malay Peninsula, and Java that the greater part of the world's supply of rubber is now produced.

In discussing the distribution of economic plants, therefore, it is necessary to make it clear to the pupil that, on the one hand, they are only cultivated in regions where it pays to do so, and that, on the other, man may so alter the character of the plant or the method by which it is cultivated that it can be grown in other regions than those to which it appears naturally to belong.

The relative productivity of different regions is a matter which cannot be entered into in much detail in school work, as the economic factors are often at

least as important as those of a geographical nature. At the same time it may occasionally be necessary to give some idea of the differences in the average yield of the chief producing areas. It does not seem extravagant to demand that pupils who are studying, let us say, Europe, in some detail should know that the average yield per acre of wheat in Russia is much less than in Great Britain. But the reasons for that difference can only be indicated in very general terms, as questions of political and economic organization, systems of land tenure, means of transport, and methods of husbandry are all involved.

In comparing also the products and productivity of the same region at different times factors other than geographical have constantly to be taken into consideration. The development of the cultivation of cotton in Egypt, for example, is very largely, if not entirely, the result of the occupation and control of that country by Great Britain. The reduction of the opium crop in China, and consequently in India, was brought about by a change in the moral attitude of the Chinese people towards the evils of opium-smoking.

The invention of refrigerating apparatus and its adaptation to means of transport has led Australia to rear sheep for mutton as well as for wool, and Argentina to produce beef as well as hides. All these matters must be mentioned if pupils are to have an intelligent grasp of the subject and to view the geographical factor in its proper perspective.

The distribution and character of the chief minerals of economic value is another matter of great importance in the treatment of economic geography. The extent to

which it is necessary or advisable to explain the geographical distribution of the world's mineral resources has already been indicated in the chapter on the Physical Basis of Geography. The respects in which different deposits of the same mineral vary from one another may likewise require to be explained. Is it sufficient to say, for example, that the steam coal obtained from the South Wales coalfield is the best available for steamship purposes, or that much of the coal mined in Cumberland cannot be used for smelting iron ore? Can we explain the different types of the gold-mining industry throughout the world without reference to the difference between gold obtained from quartz veins and that found in placer deposits?

These and such questions arise when we seek to define the limits of this part of our subject. However precisely we do so, we are in practice constantly brought up against the fact that a great deal of information essential to the proper appreciation of the geographical factor must be derived from outside sources. In truth, the geographer must be, in the best sense of the word, a learned man. In dealing with minerals he may have to throw some light not only upon the physical characteristics of minerals but upon the economic activities to which they give rise.

The part played by geographical conditions in the development of manufacturing industry is so great that it may even at times be unconsciously exaggerated. It ought, therefore, to be made clear to the pupil, not only that geographical factors do not necessarily exercise the same influence at all times, but that at any given time an industry may flourish in different regions

under very different geographical conditions. The more important factors to consider in this condition are the facilities with which raw material and fuel can be obtained, the access to markets where the products can be disposed of, and to some extent the racial characteristics of the inhabitants of the region under consideration. Each of these factors may vary greatly in relative importance. The early development of the iron and steel industry in the British Isles was in no small degree due to the fact that coal and iron ore were often found in close proximity one to another. At a time when means of communication were infinitely worse than they are now this was a matter of no small importance. The much greater iron and steel industry of the United States, however, has grown up without the advantage of such proximity, the facilities for transport provided by railways having made it a matter of much less account. Or, again, consider the relative importance of the same geographical factors in the growth of the cotton industry in various parts of the world. Lancashire has coal at hand and a favourable climate for spinning cotton. Bombay's chief advantage as far as the geography is concerned is the fact that cotton is extensively grown in the hinderland. The New England States have to import both coal and raw cotton, but in the earlier days of their industrial development derived considerable advantage from their supplies of water-power. Similarly, a region has often been able to develop its industries after it had obtained good access to markets where its products could be sold. The proximity of the Chinese market has undoubtedly been an important factor in the industrial development of Japan. That it is not the

only factor is proved by the fact that that development is of such recent date.

These illustrations indicate that it is necessary, when dealing with the economic aspect of geography, to take into account the past history of the industries which are being considered, as it is only by doing so that the importance of the geographical factor in their growth can be determined. They also indicate that in the development of industries the geographical factors may act in varying ways and with varying results. It is because of this necessity of treating each case as it were upon its own merits that we have advocated the regional method in economic geography. Nothing is more common than to find in examination papers attempts at explaining the growth of industries by a species of premature generalization. In all attempts to explain the growth of industries, also, racial aptitude must be taken into consideration. As a general rule it will be sufficient to consider this matter positively rather than negatively, that is, to consider the cases in which man by his special abilities has developed certain industries, rather than to consider those in which by his want of abilities he has failed to do so. We can, for example, say that the Japanese have shown that they have sufficient skill to undertake industry on European lines; we cannot say that the Chinese have not that skill. All that we know is that they have not yet shown on any extensive scale that they do possess it.

In this part of the subject, then, we are mainly concerned with the extent to which man makes his environment contribute to the development of manufacturing industry. But if the teacher does not at the same time

bear in mind the operation of various economic factors he will often fail to give a satisfactory explanation of the existing facts. An industry may have grown up in a region because it possessed some of the geographical advantages indicated above, but these advantages may for one reason or another have ceased to exist. The industry, however, continues to exist and even to grow because of the capital invested in it, the skilled labour upon which it can rely, and the economic organization which has been gradually evolved. In the case of many industries these conditions are all more or less capable of simple and intelligent, even if incomplete explanation. The manufacture of silk in the Rhone valley and in northern Italy was originally based upon the local supplies of raw silk. With the growth of the industry these supplies became insufficient, and ever-increasing quantities had to be imported from the Far East. At the present time, therefore, it is for economic rather than for geographical reasons that the industry continues to flourish in these regions. We may take as another example the watch-making industry of Switzerland. The carving of wooden clocks and toys developed naturally in a country where there was abundant timber and little employment during the winter months of the year. The manufacture of watches is a natural development of the earlier industry, but one which is based upon economic rather than upon geographical considerations. Sometimes, again, industries may be developed almost entirely for economic reasons. If capital is seeking investment and labour employment in any region at the same time that there is a demand for some particular commodity, either in that region or

elsewhere, an impetus is given to the establishment of factories for the production of that commodity. From German industry many illustrations of this fact can be adduced. Again, industries frequently grow up in a region, not because it offers them any special geographical advantages but because it is already the seat of a great staple manufacture, to which these others are more or less subsidiary. Lancashire with its innumerable industries, all more or less dependent upon the manufacture of cotton, is a case in point. Nor can political conditions be altogether neglected. The development of industries in various countries has often been hastened, if not entirely brought about, by a fiscal policy which taxed imports or gave bounties to exports. The growth of manufactures in our colonies, for example, has frequently been encouraged by such methods.

These illustrations show the necessity of some reference to economic and political conditions. At the same time it is not the duty of the teacher to enlarge upon them, and he must content himself with indicating that other factors than the geographical have to be taken into consideration, if a full explanation of the human activities of any region is desired. In this connexion it may be as well to point out that it frequently happens that the geographical advantages of a region for any particular industry are only made manifest through the economic result. In the early part of the nineteenth century cotton factories were more widely distributed in England than at the present time, and it was only gradually, as the superior advantages of Lancashire made themselves felt, that the industry became concentrated in that region.

All matters connected with trade, whether it be domestic or foreign, are so complicated and usually involve so many factors other than the geographical that it is hardly possible to deal with that subject in school work. What is said, however (and something must be said), may perhaps be introduced incidentally rather than formally, more especially when dealing with such matters as seaports, commercial centres, and trade routes. The exports from India at the present time are very different from its exports in the fifteenth or even in the eighteenth century. This is no doubt, in part, due to changes brought about in the agricultural economy of the country as a result of its development under British control, but it has only been rendered possible by a complete change in the means of communication between Europe and the interior of India. In the same way the export of wheat from Canada may be linked up with the construction of the railways along which the agricultural population has settled. Of course this method of treatment is not possible in all cases, but pupils should always be discouraged from learning lists of imports and exports.

In the treatment of communications regard must frequently be had to the historical development and economic importance of the more important routes. No account of the chief sea-ways of the world, for example, would be adequate which failed to take into account the general changes wrought by such events as the opening of the Suez and the Panama canals. But in addition to the distance factor there are many matters connected with ports, coaling stations, and tolls which help to determine whether ships will take one or other

of these routes. Such matters obviously cannot be dealt with in class, and yet it may often be necessary to give some indication of their probable effects. Ships sailing from Britain to the Far East, for example, will probably continue to go by the Suez Canal, which offers the shortest route, but they may come back by way of Panama. On the outward voyage they carry heavy goods to India, China, and Japan, but their return loads from these countries are relatively light. There is, therefore, an inducement for them after leaving Japan to cross the Pacific, pick up a cargo on the seaboard of North America, and make for home by the Atlantic route.

Again, it may be well to suggest some of the problems which arise out of the more important changes in the world's routes. New York, instead of being farther away than Liverpool from Yokohama and Sydney, is considerably nearer since the opening of the Panama Canal. This may affect adversely the trade of the United Kingdom with the Far East and Australia. Whether it will or not depends upon a great variety of considerations which cannot be discussed in class, but that is no reason why the problem should not be stated.

The relation of land-routes and waterways one to another is also a matter of some difficulty. The statement is constantly made that transport by water is cheaper than transport by land, but it is a statement which is not universally true and ought not to be treated as if it were. It is advisable, therefore, to explain to pupils in general terms that while transport by natural waterways at least may be more economical in the case

of heavy goods, for the delivery of which there is no immediate hurry, it does not follow that transport on canals should likewise be more economical in the case of perishable commodities or of those which in proportion to their bulk are of relatively high value. The rivalry between land and water transport may be illustrated in another way. On the one hand, we find the sea-way being extended inland by means of the dredged river channel, or the purely artificial ship canal; on the other, we find the land-way being extended seawards by means of the peninsula and even the island. The one method tends to reduce cost and the other to reduce time. So much ought to be made clear to the pupil, but into the economic aspects of the matter it is unnecessary to enter. To this, however, there may be exceptions. A very common misstatement in examination papers is to the effect that all the raw cotton used in Lancashire comes to Manchester by the Ship Canal. As a matter of fact, less than one-fifth of the cotton used in the Lancashire industry is imported by Manchester, while over four-fifths is imported by Liverpool, and this happens in spite of the fact that in pre-war days at least it was cheaper to send the cotton to the spinning towns by way of the Ship Canal and Manchester, than it was to unload it at Liverpool and distribute it from that port. The reasons for this are of an economic order and are much too complicated for explanation in class. But the facts ought to be stated.

The general conclusion to which the foregoing discussion leads us may be briefly stated in this way. In order to understand and estimate the extent to which geographical factors are really operative it is necessary

to regard them both from the historical and from the economic point of view. But economics and economic history both lie beyond the ordinary school curriculum, and it therefore behoves the teacher so to guide his pupils that they will not fall into the error of hasty generalizations and imagine that the influence of the geographical factors is constant or that they alone exercise a control upon the economic activities of man.

VII

HISTORICAL GEOGRAPHY

THE intimacy of the relation between geography and history needs no demonstration. It must be admitted as an ideal, though it may not yet be possible as a regular practice, that a general knowledge of the geography of any area (say, the British Isles, or the Mediterranean region, or Europe) should be a condition precedent to the study of its history. At the least, the study of history, in so far as it is concerned with the movement and settlement of peoples, with the establishment of states, and with the operations of war, necessarily involves a measure of geographical study. It might be urged that it is not our function to prescribe to the historian what that measure should be. But the appearance of doing so is forced upon us, for this reason —that on analysing the constituent departments of historical geography, we find that hardly any of them can stand by themselves as part of a geographical course, but on the other hand we regard them as essential parts of an historical course. So far as concerns

the teaching of geography, we have to examine (*a*) what, if any, group of historical facts belongs to the general study of the subject; (*b*) whether 'historical geography' is at all admissible as a special subject.

Historical geography in the widest sense may be taken to include:

1. The general effects of land-forms, climatic conditions, and natural vegetation—in short, of geographical environment—upon the movements and settlement of peoples in the past, their congregation into political communities or states, the definition of frontiers, the foundation of towns, and so forth.

2. The history of discovery and exploration, which is a part of the history of geography itself.

3. The results of geographical conditions in war.

Such a range of subjects obviously cannot be taken as a whole; it has no coherence; any attempt to formulate a school course in 'historical geography' on such a basis would be useless because it would involve what geography itself is always in danger of, but ought to escape, involving—a smattering of knowledge of a number of topics.

There is strong support for a much more intimate relation between geography and history in school education than we are prepared to admit. On this view geography becomes the 'handmaid' of history, and nothing else. We have no objection to geography playing this part in circumstances under which it cannot obtain a better. But we object to the view that the good geography teacher must have had an historical training. It might just as well (if not better) be urged that he must have had a training in anthropology, or

in any of several other branches of science, or in commerce. We might, if it came to that, urge that the whole of school education be set upon a geographical basis: in place of our dead languages we would learn (making use of translations, commonly called cribs) the historical geography of the Mediterranean region; our mathematics would lead specifically up to the table of averages, the survey, and the map-net; our modern language class would essay the ideal of reading excerpts (let us suppose) from Baedeker in the vernacular—and so forth; if we did this we should be not much more unreasonable on our side than the exponents of any particular branch of knowledge are on theirs, if, when adapting geography to their own uses (as we invite them to do), they deny others the right to do so, and the subject the right to stand alone.

No: we see a clear distinction of status between geography in relation to the present and geography in relation to the past. Geography in relation to the present is our subject:

The world is so full of a number of things

that the subject of geography is full enough without our turning aside to deal with other 'things' of which the world formerly was full. But the aggregation of phenomena which is summarized by the term 'geographical control' is not subject to extinction but only to modification; therefore we offer the study of these phenomena to the historian.

If we rightly estimate the prevalent attitude toward the relation between geography and history in school-teaching it is this:

1. The elements of both are to be taught at elementary

school age; probably by the same teacher; and a strong case has been made out for the value of geography as an introduction to history.

2. At secondary school age the two subjects ought properly to be taught in separate courses by different teachers.

3. In some cases this is found impracticable: history is taught with geography as a pendant dealt with by the same teacher.

With the elementary period we are not concerned here in detail. During the secondary period, if a separate course in geography is given (and it is the function of the rest of this volume to justify that), then the right hand of geography should certainly know what the left hand of history is doing. For a school course geography is more adaptable than history, and it should not be difficult to adjust the relative part of the geography course to that in history, so that the one is in sufficient measure complementary of the other.

In case (3), which we admit as a *pis aller*, geography teaching is limited to the topography of the area whose history is being taught, and to the effects of geographical influences upon that history; any broad view of world conditions and parallels, presumably, disappears. In such case we should not allow it to be stated without qualification that 'geography is taught in the school', and pupils so taught are not qualified to enter for a geography examination. The history examination should always demand some appropriate geographical knowledge.

Some of the foregoing premises call for fuller discussion.

Taking first the groups of knowledge into which we have divided historical geography at the outset—with (1) the general effects of geographical environment upon man the remainder of this book is largely concerned. Once they are understood, they can be applied either to his past or to his present state, and our case for geographical study preceding that of history is met. But here we must consider how far we ought to concern ourselves with his past, in the general geographical course itself. The answer certainly must be, not far. It should never be necessary to adduce historical illustrations unless they are self-explanatory, or unless the teacher of geography knows, through liaison with the history teacher, that they are within the knowledge of the pupil. For example, among the geographical features of Greece, those which occur first to the mind as affecting the Greeks are: (*a*) the penetration of most parts of the peninsula by the sea, and (*b*) the difficulty of access, and minute natural divisions, of this mountainous land. The prime effect of this condition *is* that the population is largely seafaring; a second effect *was* that the land was divided among many states. This second fact and its geographical cause must be known to the student of history, but not necessarily to the student of geography: it does not obtain now, and is not pertinent to the present condition of the country. 'But', it may be urged, 'you have pitched upon the worst example possible; the early history of the Mediterranean lands is of such transcendent importance that any geographical teaching concerning the Mediterranean region ought to take cognizance of it.' We do not accept that view. We would only admit

such teaching as a necessary accompaniment of a course in classical history. The Mediterranean region provides an excellent special subject in geography, but it is doubtful if it ought to be taken as such unless in company with one phase or another of the history of the region. By way of general evidence of the profound effects of geographical conditions, say, in the eastern Mediterranean lands, we might permit ourselves to borrow simple historical illustrations from the Egyptians, secure and powerful in their fertile valley fortified by desert; from the early Cretan civilization, secure and powerful in its insularity, and from the Phoenicians, driven seaward by their inhospitable background. These can be lifted out of their historical context and remain intelligible and of value; they belong, moreover, to the history of geography itself; but even they and other illustrations like them are rather dangerous to handle, and if we find them in geographical text-books we prefer to premise that they are put there for the use of those who have the knowledge to use them.

The detailed analysis of frontiers is an advanced subject, outside the scope of the secondary school. But recent events have generated an interest in international frontiers which our teachers lacked. It is not, but it well might be, usual to find the pupil appreciative of the relative value of mountain frontiers and river boundaries (a controversial question, it is true, but one from which certain established facts emerge), or the circumstances under which boundaries neglect natural features altogether, or the relation between frontier regions and scanty population, together with the geographical conditions which dictate the latter factor.

We can supply the historian with this material; it is his part to supply the political data, and he may claim with some reason that frontiers are after all a matter of history. So they are in so far as concerns the period and circumstances of their definition. But there they stand, on our maps, and not the strongest claims of the regional method should compel us to neglect them altogether. Geography which is of practical utility thinks first in terms of political divisions.

A subject which is essentially historical in nature, but does not fall within the view of the pupil in school history, is that of the position of towns—both position in relation to environment and actual site. This subject is in certain respects liable to mishandling. It belongs to us; it possesses interest and value; but as with others of our branch lines, we must not follow it too far. It is true that when we have simply located a town on the map we do not know all we ought to know about its position; but we cannot seek to impose even upon the secondary school pupil an infinite list of towns with an infinite list of reasons for their position. The result, if we attempt too much, is that one or two ideas and catchwords are grabbed by the pupil as the straw by the drowning man, and utilized on every occasion, appropriate or otherwise. From this follows a type of examination answer of which this is an example in summary. The question asked for an explanation of the position of the towns of A, B, C.

'A is a gap-town. It is situated at the entrance of the valley of the X into the mountainous district of Y.

'B is a gap-town. It is situated on the river Z in a wide plain.

'C is a gap-town. It commands the passage of . . . from its position on a high hill.'

Here was a fatal case of indigestion and repetition of a catchword whose meaning had never penetrated. The positions of towns are not, at least in school teaching, expressible intelligibly in categorical terms. Indeed, we do not possess an agreed classification. G. G. Chisholm demonstrates this, for example,[1] referring to the systematic inquiry into the growth of towns by J. G. Kohl, whose work, he says, has formed the basis to a large extent of what has been said upon the subject by Ratzel, Reclus, Hahn, Richthofen, Brunhes, and others (a list which is not a happy commentary upon British geographical research). But even if such an agreed classification existed or were possible (which may be doubted) it would be too cumbrous for school use. We would not set children down to learn, with examples, all that is implied in connexion with the positions and sites of towns by considerations of commerce, strategy, transport by land or water, geological formation, water-supply, mineral wealth, healthiness, and the rest. But certain leading ideas are within the range of the pupil, such as (following Chisholm again): (*a*) the relation between a seaport and its hinderland, (*b*) inland navigation facilities, (*c*) favourable crossing-points of a river, (*d*) points of marked change in direction of a river: consequent change of transport between land and water, (*e*) railway 'corners' and junctions, (*f*) sites at the meeting of hills and plains, especially where valleys give access to passes, (*g*) the existence of water-power, minerals, &c. The application of these

[1] In *Scottish Geo. Mag.* xxx.

principles can best be ensured, in most cases, by accurate reading of an adequate map, and the study of town-sites is one of the best forms of exercise in map-reading. It is also, in Chisholm's view, one that may serve in a large measure to counteract the criticism that the ideas dwelt upon in the later stages of school work are essentially the same as those of the elementary stages, because it is possible to present cases of increasing difficulty in proportion to the advancing knowledge of the pupil. (If this be so, the refutation of the criticism appears to us to rest on a rather exiguous foundation; the criticism itself, however, we suspect to rest upon an inflated view of the proper scope of elementary geography.)

If we grant the study of town-sites as a part of secondary school geography, we do so mainly as a map exercise; we do not ask that it should be too strongly insisted upon, for its results soon cease to be of much practical value. We should expect the pupil to retain knowledge of only a limited number of salient examples, and we should be chary in the choice of concrete examples in a common examination paper, on the ground that the examiner's selection may so far differ from the teacher's as to operate unfairly against a particular set of candidates. And lastly it seems necessary to recall in this connexion the adage about the custody of the custodians. Map-reading the site of a town may ensnare. To take a definite case: the 'gap-towns' of the North and South Downs are beloved examples, and with reason. But the eye of many a writer of text-books, running along the line of the North Downs, has caught the name of Sevenoaks in Kent, and into his list of 'gap-towns'

it goes. Sevenoaks is not on the North Downs; it (or its ancient nucleus) stands on the top of the ragstone ridge, 300 feet above the Darent valley on the one hand and that of the Medway on the other; the Darent gap in the Downs, which is the source of the 'gap-town' fiction, is four miles off, and is followed by neither the main road nor the main railway which approach Sevenoaks from the north; while the railway, so far from finding any gap, uses a tunnel near two miles long practically underneath the town itself. Nothing in the history of Sevenoaks anywise connects it with the Darent gap; and we adduce this small example (it is not unique) as an illustration of the dangers of geographical theory as against geographical and historical fact.

We have defined above as a section of our subject the history of discovery and exploration, and we have encountered proposals for a course in this section in secondary schools. We doubt the value and the practicability of such a course. Its interest could not be denied. As a holiday task, one of the great travel-narratives could scarcely be bettered. But we can hardly suppose that a course in the whole subject of the history of exploration, from Necho of Egypt down to Shackleton, could be seriously contemplated, and the scope, starting-point, and stopping-point of such a course are not easy to determine. We are bound at least to glance back to the earliest known period. We must inevitably give some idea of the world (in the words of the historical atlas) 'as known to the ancients'. We have to start from the Mediterranean centre (in the absence of evidence as to early exploratory effort from other centres), and

we should do so in the possession of some idea of the early Mediterranean civilizations, among which that of the Phoenicians should take its proper place, and should not be regarded, as it often is for our purpose, as the fount and origin of the whole business. The germ of exploration is found in commerce, and we can illustrate that by a number of examples, and account by means of them for the exiguous nature of early beliefs as to the remoter parts of the world (traders were never prone to table their cards); but at the same time we can adduce examples as to the wide range over which travellers' tales were borne, such as that of the beautiful description, scarcely to be doubted, of a northern fjord-coast under the midnight summer light in *Odyssey* x. We cannot exclude some reference to the extension of knowledge of the world by the seafaring Greeks, by Alexander the Great during his campaigns (329–325 B.C.), by the Ptolemies of Egypt, and under the Roman Empire, for the Dark Ages and the aversion of Christian teachers did not entirely obliterate that knowledge. And at this time (from the seventh century onward) the Arabs, unaffected, were carrying on the work, through such men as Masudi (first half of the tenth century), Idrisi (*c.* 1100–54), and Ibn Batuta (1304–78). They provide the chief link with the re-awakening of interest in exploration which began in the fifteenth century and offers a second jumping-off point for the projected course in the history of the subject. In Spain and Portugal this awakening was first evidenced, and Arab influence in those countries was powerful.

The renascence of exploration took place in a lustrous

period of human history which so eagerly invites study as to indicate that the history of geography can only be treated as a pendant to an historical course. We have observed the historical geography of North America set as an examination subject, and we may go a few steps in its consideration here, by way of example. It might appear an appropriate subject to this extent: that without any very long excursion into purely political history it might be possible to arrive at a sufficient understanding of the origin and development of our own oldest colony, of our own most extensive overseas dominion, and of a great republic kindred to ourselves; it also incidentally reveals a glimpse of the less fortunate results of Spanish expansion overseas.

It was in the early part of the fifteenth century that the Portuguese, inhabiting a small territory with a relatively long coast-line and no great depth of hinderland, began under the inspiration of Prince Henry the Navigator to undertake exploration overseas on a large scale. Their interests lay southward along the shores of West Africa and in the Atlantic isles (the Canaries, Madeira, and the Azores), and subsequently eastward, when in due course (1498) Vasco da Gama reached India by way of the Cape of Good Hope. But meanwhile old stories of islands to the westward, in the unknown Atlantic, and the theory of the sphericity of the earth, began to be revived, and inspired among others Christopher Columbus, who, a Genoese by birth, got Queen Isabella of Madrid to patronize his plan of reaching the Indies by sailing west from Europe, after he had offered the chance to his own city, to Venice, to France, and to England. He landed, probably on

Watling Island of the Bahamas, in 1492, extended knowledge of the West Indies in subsequent voyages, and saw the mainland of Central America, and (by the way) never supposed otherwise than that the lands he had discovered belonged to Asia. The new continents, however, were soon recognized as such, and their name was derived, probably quite undeservedly, from Amerigo Vespucci (1451–1512), a Florentine navigator in Spanish and Portuguese service, with a wonderful power of imagination, if not of something worse. The Portuguese and Spaniards kept mostly, though not entirely, to their own and lower latitudes in the exploration of the New World. So far as concerns North America, the Spaniards' most important connexion was with Mexico, where they founded New Spain in 1519–21, and thus became progenitors of the most notorious among the hysterical daughter-states which they planted out in the New World. Mexico did not become independent of Spain until 1820–1, when it included considerable territories which the Spaniards had nominally conquered to the north, in what are now California, Arizona, New Mexico, Texas, Utah, and part of Colorado ; the existing frontier was only arrived at in the years following the war between the United States and Mexico, which terminated in 1848. The eastern half of it is defined by the Rio Grande ; the western follows mainly mathematical lines ; it has the virtue of running through sparsely populated territory, but nature offers no barrier to trespass and frontier incidents, which flourish perennially. But the original frontier was no better ; North America does not by its configuration offer natural frontiers running east and west. The remaining

activities of the Spaniards in North America are confined to such excursions as that of Juan Ponce de Leon in Florida in 1512.

The focal points in the discovery of North America which concern us more closely than the scene of Columbus's achievements are Newfoundland and the St. Lawrence. Several European nationalities shared in this work. The attractions at first were (1) a north-west passage to the Indies, and (2) the Newfoundland fisheries. The French, the Spaniards, the Portuguese, and the British were all interested, and made more or less dubious claims to priority. Thus, Basque fishermen worked the banks of Newfoundland in early years without looking beyond them, and the Spaniards maintained a shadowy claim to fishing rights down to 1763. But the outstanding figure is John Cabot, a Genoese (like Columbus) by birth, a Venetian by citizenship, an English seaman in virtue of his employment by King Henry VII. In 1497 he discovered Newfoundland and touched the American mainland; in another voyage in the following year he thought he saw the way clear to the East Indies, and drew followers after him on the quest for the north-west passage, valueless as regards its avowed object, which leads through the great names of Cortereal, Frobisher, Davis, Button, Baffin, and does not disappear as a commercial objective till near the end of the eighteenth century. The French were the first to show interest in northern North America for its own sake, and the earliest (unsuccessful) attempt at colonization was made in 1518, while it was in French employ that an Italian, Verrazano, systematically explored the

Atlantic seaboard from Carolina to Newfoundland in 1524.

So far as concerns the acquisition of geographical knowledge of the continent, we can follow the labours of such pioneers as Samuel de Champlain, who between 1603 and 1635 extended exploration south of the St. Lawrence, where he has left his name to a lake famous both in geography and in history, and also as far west as lakes Huron and Ontario; of Roman Catholic (especially Jesuit) missionaries, some of whom were established on the shores of Lake Superior in 1666; of Radisson and Groseillers, who saw the western prairies and the Mississippi in 1659; of Joliet and Marquette, who descended part of the great river in 1673, and of La Salle, who reached its mouth downstream in 1682 and claimed 'Louisiana' for the French. At the same period the strong governor De Frontenac was consolidating and extending knowledge of the country nearer the seat of the French power, and after the removal of the menace of the Iroquois Indians on Lake Ontario the direct way to the west was open, so that La Verendrye in 1743 was the first known European to see the eastern face of the Rockies. But French exploratory zeal outran the power of the State to support a continental dominion, and by the Peace of Paris in 1763 'New France' in North America became British territory. We shall return to Canada (viewing it from a different angle) in a later paragraph.

In the territory which is now the United States we find early enterprise in settlement and exploration of a cosmopolitan order, British, French, Spaniards, Dutch, and Swedes all having shares, though those of

the two last were soon obliterated by the British. Settlement on the Atlantic coast began early in the seventeenth century, and a slow movement westward therefrom soon set in. Private adventurers acting under charter showed the way; we cannot here detail the activities of such bodies as the New England Council, the Massachusetts Bay colony, the Virginia Company, and the rest of the earlier group, or of those of the later group which included the Carolinas (1663), New York and New Jersey in the following two years, Pennsylvania, Delaware, and lastly Georgia (1732). From the geographical standpoint we have to take special note of the isolation of the colonies and their distance from the mother country; three months was the least period for communication and reply between home and colony. Despite the subsequent accretion of interest, judicious or otherwise, taken in the colonies by the home government, one of the germs of the independence of the republic ratified by the peace of 1783 is found in the geographical isolation of its territory. We can pursue the territorial expansion of the republic westward by investigating or drafting a map—a very simple one—illustrating its growth; taking note of the importance of the Mississippi as the earliest western boundary.

But all that we have written here takes little account of political history as such, and the less the farther we pursue the subject from our standpoint. Of course we are not suggesting that the indications we have given in the preceding paragraphs cover anything approaching the whole field of the 'historical geography' of North America, but we do suggest that even in this case, where 'historical geography' comes nearest to providing

a sufficiently complete story of a continent, it does not come near enough, and that it is not our function to teach that story, but only to supply its setting. It appears, therefore, that so far as historical geography as a school subject is concerned our elaborate example has merely proved a negative; but at least it has been attempted to illustrate the geographical circumstances appropriate to historical study.

The British Empire overseas offers opportunity for possible courses, if not in historical geography, at least in history which is fundamentally geographical. (It is a point worth bearing in mind, in connexion with all geographical teaching, that as there is a British Empire why not make use of it?) In this connexion attention may be paid to the natural course of geographical expansion, in the first instance, across the Atlantic; that is to say, across a direct and unhampered seaway; we thus find, at the head of the list of British overseas possessions in respect of antiquity, Newfoundland, of which Sir H. Gilbert took possession for the Crown in 1583. This event is followed during the seventeenth century by the successive acquisition of islands in the West Indies—Barbados (the Bermudas), St. Kitts, Nevis, Montserrat and Antigua, St. Lucia (and Honduras in the same year, 1638), Jamaica, the Bahamas, the Virgin Islands, the Turks, and Caicos. The foundations of the Indian Empire were laid early in the seventeenth century also (the royal charter was granted to the Honourable East India Company in 1600); but apart from this the lands bordering and islands in the Atlantic (which at that time afforded the only feasible route not only to the Americas but to the

East) held the field of imperial activity down to the later part of the eighteenth century. Thus we have the early establishments in West Africa—Gambia (about 1618) and the Gold Coast (about 1650)—to which we shall presently refer again—and St. Helena in 1651, which was first occupied by the East India Company.

The Mediterranean possessions, in the historico-geographical aspect, point out progression from west to east; Gibraltar was first secured in 1704 and Malta in 1800, long before their importance in relation to a highway to the Far East and the Pacific was foreseen. Cyprus was not occupied till 1878, and any strategic considerations in connexion with its occupation were weakened when we assumed the control of Egypt.

We cannot in these pages complete even the most skeletonic summary of the expansion of the empire, but we may point to certain salient periods in that expansion in different quarters. Thus in North America we have the original settlement of Nova Scotia in 1628; it was soon ceded to France, but was recovered, together with further territory, including the present New Brunswick, by the Peace of Utrecht in 1713. Thereafter we may trace gradual extension through the continent, though it did not take place progressively from east to west, since the Hudson's Bay Company, chartered in 1670, had pointed the way to the far north-west at that early date. 'In 1759 Quebec was taken, and with the capitulation of Montreal in the following year Canada became a British possession,'[1] the peace of 1763, as we have said, confirming. The details of settlement

[1] H. E. Egerton, in *Oxford Survey of the British Empire*, vol. vi, ch. 4.

in the middle and far west cannot be given here, but we may note that the Hudson's Bay Company surrendered territorial rights to the Crown in 1869, that Manitoba became a province of the Dominion in 1870, and that British Columbia (where the discovery of gold in the Fraser River in 1856 had led to the establishment of a Crown Colony two years later) joined the federation in 1871. On the other hand, Saskatchewan and Alberta were not ripe for establishment as provinces until 1905, and they, Manitoba, Ontario, and Quebec have all received territorial extension since; in all of which events we have to trace geographical influence upon commercial and political development.

In Australia we find, at first, geographical isolation dictating the principle of convict settlement. The first Australian colony of New South Wales was proclaimed in 1788, but within thirty years free settlers began to arrive, the way to the interior over the Blue Mountains was found, and settlement started to form the nuclei of the several states of the future Commonwealth. Tasmania (Van Diemen's Land) began to be settled about 1803; early settlements in Queensland, Western Australia, Victoria, and South Australia took shape during the dozen years 1824–36. The discovery of gold in New South Wales and Victoria in 1851 is a landmark no less to the geographer than to the historian.

In dealing with Africa our salient points and periods include: (1) the earliest period of interest in West Africa, to which we have referred already. This is closely associated with the development of the sugar trade in the West Indies, since it was in this connexion that England took up the slave-trade, working through

companies, and doing little else, in West Africa, but establishing forts to protect that trade. The obvious geographical factors here are: (*a*) the connexion of West Africa and the West Indies by the Atlantic seaway, (*b*) the more favourable insular conditions in the West Indies for development under the supervision of white men, as against the wider field for the recruitment of black labour, offered by the sub-continent of West Africa. After the official abolition of the slave-trade (1807) the West African settlements served as control-stations for its suppression, and the colony of Sierra Leone had previously (1787) been founded as a refuge from slavery. (2) Then comes the period of chartered company development, for which the motive was trade, and of great exploring expeditions, and this is illustrated both in West, East, and Central Africa, as by the Royal Niger Company, the Imperial British East Africa Company (1888), and the British South Africa Company (1889) in Rhodesia; and by the work of such travellers as Mungo Park and Clapperton, Speke and Grant, Livingstone and Stanley. (3) Upon these developments follows the period of political partition—which supplied instances of the flag following trade—as to which Egerton, in the chapter already quoted, remarks that 'the Berlin conference of 1885 supplied rules for the game'. (4) The history of the Union of South Africa with enclaved territories must be viewed apart, starting as it does with a consideration of the importance of Cape Town as a station on the 'Cape route' to the East (the colony was first captured from the Dutch in 1795), and involving a period of war (1899–1902) with an organized white republic such as has not

been established elsewhere on this continent. The repartition of Africa is even now in progress; the names of Ostafrika, Kamerun, Togo, and 'Sudwest' disappear, and Tanganyika Territory and others take their places.

What (if anything) have we succeeded in suggesting by the preceding scanty references to factors and incidents in the erection of the British Empire? We seem to have established at once the kinship and the separation between geography and history. The factors and incidents referred to are by no means all geographical. The first causes of British expansion overseas are in some cases geographical. Our small islands with their favourable coasts and fine harbours, our position as an outpost of Europe, our consequent outlook across the seas—these are texts, so to speak, from geographical scripture. We may again quote Egerton:[1]

'At the present time the value of colonies as a field for British emigration is obvious enough; but in the England of the close of the sixteenth and the beginning of the seventeenth century, though there was occasional economic distress owing to a variety of causes, it could not be said that there was over-population; and in fact it proved extremely difficult to obtain labourers for new colonies. The main motives for imperial expansion were, then, (1) the political argument. Spain and Portugal had grown powerful by means of the riches of their colonial dominions; to secure her place in the sun, England must follow their lead. Closely connected with this view was (2) the desire for gold-mines. To the economists of the time gold and silver were the principal forms of wealth, and it was the expectation of the discovery of gold-mines which doubtless caused the

[1] Loc. cit.

general interest in the Virginia Company [chartered in 1606]. But apart from the thirst for gold, there was (3) the recognition that a colonial empire might produce many of the things that had to be obtained from foreign countries, and thus add both to the strength and to the wealth of England. A self-sufficing empire played a great part in the arguments of those advocating overseas expansion. But, whatever men's aspirations, it must be remembered that the State was still very weak, being supported neither by credit nor by adequate taxation, so that whatever was attempted in the way of expansion must have been by means of private enterprise.'

In that paragraph there are suggested certain ideas with which geography is definitely concerned—the occurrence of mineral wealth and the distribution of other natural products—and certain other ideas with which geography is not concerned, such as the circumstances under which Spain and Portugal had been able to acquire colonial dominions, and the part played by private enterprise in our own expansion overseas. In that fine standard work, the *Historical Geography of the British Colonies*, edited by Sir Charles Lucas, we have, on the one hand, descriptions of the various territories of the empire, and on the other their histories, from which, having regard to the title of the whole, we might infer the equation that geography + history = historical geography. This would clearly connote that we the geographers supply the frame and the landscape of the picture and the historians supply the human figures; or, if it be preferred, we the stage and scenery, they the players. But we should go farther: historical geography must not be regarded as merely a mechanical compound of history and

geography, but as a chemical compound, and the earth is more than a picture-frame in so far as it exercises a controlling effect on man's activities.

With strategic geography as such—(3) in our grouping at the beginning of this chapter—we cannot concern ourselves in a secondary school course. But here, again, geography must enter intimately into any historical teaching which involves that of operations of war. This aspect is dealt with (except for very recent periods) in Hereford George's classic on the *Relations of Geography and History*. This book has been prescribed in certain more advanced common examinations. But its use, or that of any book on similar lines, involves more historical than geographical instruction from other sources; such works, while supplying sufficient self-explanatory geography for their purpose, do not supply sufficient self-explanatory history. Here again, then, we offer such material for the historian's use; it is his part to use it.

Summarizing, therefore: the object of the geographical teacher should be to collaborate with the historical teacher in every possible way. The geographical teaching of any area should be always a sufficient step ahead of the historical. The geography teacher (assuming that the two courses are not taught by the same person) should not trench upon historical facts other than such as do not fall within the historical course, and are definitely illuminating and intelligible in their geographical but out of their historical context. We do not consider that the history of exploration, taken by itself, forms a suitable secondary school course: it is too big; its proper understanding can only follow

upon an ample knowledge of general geography on the one hand and general history on the other. Nor do we offer the historical geography, so called in distinction from the political history, of any part of the world as the possible subject of a course by itself.

Special circumstances (among which the personal element is potent) have at one time or another, or in one place or another, given the teaching of geography according to the recast methods of recent years a distinct historical bias, or again a distinct regional bias, or yet again a bias backward toward the old method of bare question and answer. Between all these and similar influences a middle course can be taken. Geography as a school course can stand alone, and is not dependent on any other subject of a school course, but it can collaborate with others, and with history most effectively.

VIII

RACIAL AND POLITICAL GEOGRAPHY

THAT the economic, social, and political conditions under which men live are all to a greater or less extent influenced by geographical environment is obvious; but the nature of the geographical influence varies both in time and in space. The reasons for this are partly historical and partly ethnical. The former are discussed in other parts of this book, and it is with the latter that we are here concerned. That different races of men differ in the extent to which they have developed the region in which they live is a matter which requires no demonstration, and the question at once arises how

far some knowledge of these different races must be included within the school curriculum. All will agree that this must be confined within the narrowest possible limits. In the first place, the subject is one for the ethnologist rather than for the geographer, and in the second it is one which on account of its difficulties and obscurities is almost wholly unsuitable for school study. All that is suggested here is that sufficient should be taught to enable pupils to realize the main divisions into which the human race falls, and to which division the inhabitants of at least the more important political units belong. Needless to say we do not include any knowledge of the physical characteristics upon which racial distinctions are based, nor do we include any account of the past migrations of man beyond the occasional references which any well-trained geographer will naturally introduce to clear up difficulties or to make his teaching more vivid.

Perhaps we may best illustrate our case by a consideration of what the pupil ought to know about the races of Europe, supposing he is giving, as he ought in these days, a little more attention to that continent than to the rest of the world from this aspect. It is generally recognized that there are three important elements in the population: the Mediterranean, which is found on both sides of the Mediterranean Sea and is predominant in peninsular Italy, in Spain and Portugal, and in the south of France; the Nordic or Teutonic, to which most British, Scandinavians, Germans, and northern French belong; and the Alpine, which includes the Slav peoples. The value of this general sketch, which need not be elaborated, is that when pupils come

to consider the inhabitants of any one country they have a scheme before them into which these inhabitants can be fitted. Merely to say that the bulk of the population in Bohemia and Moravia consists of Czechs, and in Slovakia of Slovaks, gives little information about the people of Czecho-Slovakia, but if the pupil realizes that the ethnic affinities (he need not be troubled with this expression) of these peoples are with the Russians, the Poles, and the Yugo-Slavs, and not with the Germans or the Magyars, he will have some idea of the position which they occupy in the European family and of the conditions which led to the formation of their State. Similarly, he must learn that Yugo-Slavia is the country of the South Slavs; that is, of the Slavs who are separated from their kinsfolk farther north by intrusions of the Germans from the west and of Magyars from the east.

From Europe in particular, at the present time (though the point applies by no means exclusively to Europe), we may illustrate the very real danger of neglecting man in his national aspect in geographical teaching; for the existence of that danger emerges clearly as a result of the Great War and the peace settlements following it. Should the pupil have heard, for example, before they emerged into political prominence, of the Letts, Ests, Lithuanians, Poles, Serbs, Croats, Slovenes, and the rest? Even if not, he should hear now. The danger that he may not hear of them lies in an extreme application of the regional method. We yield to none (as we have shown elsewhere) in admiration for the teaching of geography on a regional basis as a method practical and essential to certain ends.

The regional view has been proved essential in early stages of learning about the world as a whole, and it is no less essential at an early stage of viewing any continent as a unit. But after that the political division must be brought into relation with the regional division. After all, the practical, working geographical units into which men divide themselves (or each other) are the political; and even if the sole use to which in later life we put our schooling in geography is to read with understanding the foreign intelligence in a newspaper, the ability to do that is a practical gain. This point appears the more worth insisting upon, since a question set in a widely-taken common examination almost at the time of writing this chapter revealed the fact that scarcely 2 per cent. of the candidates appeared to be aware that any political changes at all had taken place in Europe since the war! It should be a function of the teacher to keep up to date, at least in the larger affairs of current geography, even if the text-book and the atlas fail to do so.

Reverting to the main line of argument let us take the case of Africa. Unless this continent is being treated as a special region a very brief outline of its ethnic conditions will suffice; but it is obvious that if geography is properly taught some distinction must be made between the people of Egypt with their age-long civilization and the inhabitants of the Congo forest whose culture is of the most primitive description. Hence we are forced to distinguish the Mediterranean stock of the north from the negro of the centre and the south. Further distinctions in the Mediterranean race, for example that between Hamites and Semites, are

obviously not for the ordinary school course. With regard to the negroes the main point to notice is the difference between the Sudanese and the Bantus, which, though it rests upon a cultural rather than an ethnical basis, is well worthy of consideration. The distribution of European man in South Africa will, of course, be noted.

So far we have been dealing with cases which present relatively little difficulty; but matters are somewhat more complicated in a region like India with its great variety of ethnic types. In appearance the people vary from some who are almost creamy white in complexion to others who are jet black; in civilization they range from those who are at least on as high a level as European man to those who worship stones and still delight in human sacrifice. All that can be done is to point out that these differences exist, and this the teacher can best do by showing that India, because of its fertility, has always been desired by the peoples of less favoured lands; and that in addition to the original inhabitants, of whom we know little, there have been many invaders, some of whom were akin to the Mediterranean race, while others were of Mongol extraction. If the information thus given does not carry the pupil very far it at least ensures that he will not fall into the error, which as the examiner knows is very common, of regarding the people of India as negroes, and imagining that they should be ruled as such; or the equally fatal blunder of regarding all the inhabitants as being at the same cultural level with a common national sentiment.

These illustrations indicate that in our opinion the teaching of ethnical facts should be reduced to a

minimum; but they also indicate that that minimum is necessary if the pupil is to consider intelligently the influence of environment upon man and of man upon environment. Above all it is necessary that he should have nothing to unlearn; and the conscientious teacher of geography, knowing well the pitfalls which beset him, will see to it that his own knowledge of racial geography is considerably in advance of the small amount here laid down as essential.

The greatest danger against which the teacher has to guard in this part of the subject is that of overstressing the function of race in geography. The danger is all the greater because it coincides with the popular fallacy which attributes most if not all characteristics of a people to their ethnical descent, ignoring altogether the influence of physical and economic factors. It is, of course, on the existence of these factors that the whole fabric of geography rests. A clear explanation of the fact that race and nationality are not synonymous is essential in school geography, lest pupils fall into the errors of politicians and statesmen. The full analysis of nationality involves ideas beyond the scope of school geography, but it can at least be pointed out that a well-defined natural region and common interests may be more important deciding factors than racial unity. The emergence of a new nationality in America from the mingling of the races and nations of Europe is an example that can easily be grasped. Others will suggest themselves to any teacher of geography.

With the question of race the question of racial characteristics is intimately connected. But with many of these characteristics the geographer as such is not

directly concerned. It seems to us therefore that the teaching on this subject should be indirect rather than direct. Instead of labelling different races, as is sometimes done, with various epithets usually more or less opprobrious, it is better to give some account of the conditions of life and work of the people concerned. In this way pupils will learn that the Chinese are hard-working, that the Arab raider has a very different standard of morality from our own, and that the negro if left to himself will not develop a high state of civilization. In her book on *The Teaching of Geography* Miss L. Winchester shows how some of this information at least can be given to quite young children.

IX

MAPS, MAP-READING, AND MAP-MAKING

THE constant use of maps is an accepted principle in geographical teaching, but it cannot be too strongly emphasized that it is only with the help of maps the subject can be given reality and true educational value. The practical difficulty in studying regions on the ground can be met, even if not overcome, by the use of adequate maps. At the same time it is essential that the pupil, and the teacher too, should realize that maps are representations of the units, or certain aspects of the units, under consideration. The smaller the scale the more must they be regarded as working approximations, but even in the largest-scale and the most perfect map cartographic skill falls far short of reality. The teacher must further bear in mind that the map is the notation

of the geographer and that without familiarity with the notation of the subject its study cannot proceed. The map is not an end in itself; cartographic representation of facts is the graphic means which the geographer employs in studying distributions and their possible causal relationships, but the maps he compiles mark a step in his geographical argument and not its culminations. The map must be interpreted.

The practical study of maps must entail the art of map-reading. This is generally taught, quite rightly, from maps of the Ordnance Survey, but it is important to point out that while most symbols are self-explanatory, and more or less international, they are nevertheless essentially arbitrary, and are merely employed in order to record certain facts in a graphic manner without obscuring the face of the map with written words more than is necessary. In the elementary stages of map-reading nothing could be more desirable or conducive to a grasp of the geographer's notation than the employment of large-scale maps on which all place-names are omitted. The written words on a map inevitably draw attention from the symbols, especially those used to denote relief, and it is difficult to divert attention from the place-names to the geographical features. But such maps, unless in the form of comparatively small-scale wall-maps, are not obtainable with ease. Their provision, however, would improve geographical teaching.

Map-reading must, of course, not be confined to the explanation of symbols. It fails if the pupil cannot visualize a piece of country after studying the map. Much experience in examining in school geography

has convinced some of us that map-reading is often badly taught. It is not so simple a problem as some non-geographically minded teachers suppose. Questions which entail the understanding that an ordnance map attempts to represent as faithfully as possible the features of a certain area too often result merely in the description of the map itself and the tabulation of the meaning of the symbols. To correct this fallacy a concrete study of the home region on the ground with the constant use of a map is almost essential. Herein lies one of the great merits of intensive regional survey in laying sure foundations of geographical thought.

As far as school geography is concerned the use of large-scale maps must inevitably be limited to the home country, perhaps even the immediate vicinity of the school, and world geography must be taught on smaller-scale maps such as wall- and atlas-maps. These are necessarily somewhat generalized and too often crowded with detail, especially names. It must always be borne in mind that the class teaching should never outreach the scale of the map. It is not only valueless but actually misleading to teach the details of (say) Balkan geography to a class whose largest-scale map of the Balkans is 1/15,000,000. An instance of the bad effect of small-scale maps is the common belief, as evidenced in school examinations, that Africa has no rivers except the four or five large ones that every map shows. Such small-scale maps are, of course, particularly misleading in respect of surface relief and coastal indentations. The ideal of detailed large-scale maps is, at present at least, beyond realization in schools. Perhaps after all to show the world on a large scale is a little confusing

to beginners, and apt to obscure the dominant notes in the geographical argument, but it is essential when detail is introduced.

A somewhat neglected aspect of the use of maps is that of teaching space relationships. Here, of course, the globe is the ideal, and Mercator's projection valueless.

To obtain a sense of proportion of the land areas, oceans, and world-states one to another is an important aspect of school geography. Unfortunately much school teaching distorts this sense and gives wrong values both by the use of Mercator's projection and by the employment of atlases in which attention is not sufficiently drawn to the many different scales in use. In both cases, of course, the sense of proportion could be cultivated by constant reference to a globe. Too often, however, it is some gaudily coloured Mercator maps of the world which the child sees daily, and whose mental image is fixed in his brain.

As regards the general requirements of a school atlas we may refer to the report of the British Association Committee on the subject (*Report* of the British Association for the Advancement of Science, 1913). No entirely satisfactory atlas on these lines has yet been published, although in this connexion we do not overlook the substantial improvement in school atlases in recent years.

In teaching space relationships the globe is essential to the explanation of great circle routes. The idea is not difficult to grasp or to explain, and is already supplied by meridians and the equator. It should certainly be included in geography teaching, at least in higher forms.

In respect of the difficult subject of map projections

little can profitably be done with younger pupils beyond an insistence of the impossibility of accurately presenting a curved surface on a flat sheet. Until this is grasped there is a mental gap between the globe and the map in daily use. This naturally leads to a conception of the kind of errors which map projections and network entail. It does not seem unreasonable to ask that pupils should understand that correctness of either area or shape must be sacrificed in the construction of a map. Without this modicum of explanation the divergences between different atlas- and wall-maps remains a puzzling mystery or at worst gives an ill-balanced conception of the world.

Further instruction in map projection is desirable in the case of older children, but should not be pressed to the exclusion of any part of human or physical geography. The subject affords great scope for differences in treatment and the ingenuity of the teacher. The late Prof. A. J. Herbertson, in an article in the *Geographical Teacher* (v, No. 28, 1910),[1] expounded a method of treating the general principles of map projection on empirical lines with the help of skeleton wire hemispheres. The treatment is entirely non-mathematical and should present no difficulties to any older pupil. Moreover, it lends itself to expansion and leads naturally to the explanation of the principles underlying such well-known projections as Mercator, Gall, conical, Sanson-Flamsteed, &c.[2]

[1] Also issued as a reprint and sold separately by the Geographical Association.

[2] We have intentionally omitted the useful Mollweide projection because the explanation of its uncouth shape is too difficult for

The ability to use high grade survey instruments is not essentially part of the mental equipment of the geographer. At the same time it is desirable that he should have some acquaintance with the principles involved in such work and should be able, if need arises, to conduct a piece of simple survey. In expressing this opinion we are not blind to the value of training in accurate scientific measurement which training in survey methods entails, but we feel that this work cannot in justice to the subject be included within the wide compass of school geography. Adequate instruction in the use of survey instruments entails such extensive field training, that geographical study would be seriously curtailed and given a one-sided outlook if its inclusion were demanded. Rather than sacrifice the limited time available for class instruction in geography the teacher must curtail the instruction in survey work.

The fundamental principles underlying survey with chain, plane table, compass, or theodolite, are so simple that a good teacher should find no difficulty in explaining them to pupils who have any knowledge of geometry. This much should certainly be done in the higher classes if it is not included in the mathematical teaching. It has been amply shown in the instruction of Boy Scouts that elementary map-making with the plane table is

school pupils to follow. Sanson-Flamsteed may not be easy, but at least the spacing of the parallels offers no difficulty and it affords a bridge between the globe and Mollweide. The latter cannot well be avoided in wall- and atlas-maps, although a simple cylindrical projection such as Gall's stereographic, which is easy to understand, would be preferable. In certain text-books Gall's stereographic is used for world maps, but Mollweide is still general, having rightly ousted Mercator.

fascinating to young pupils, who can with a little experience acquire a reasonable degree of proficiency. Survey and map-work generally is a useful subject of instruction for boys in the school cadet corps, and might be extended in the case of boys preparing for the army and certain other professions. The subject is more suitably begun with the plane table than, as usual in school books, with the chain. The use of the latter is uninteresting and restricted in value, and entails, on the part of young pupils, much guess-work in place of experienced judgement or accurate measurement.

The plane table, when once the simple principle is grasped, explains itself and grows more fascinating as the work proceeds and the maps appear. There should, if possible, be found time for some outdoor work with the plane table. The expense of the instrument need not be a deterrent, since home-made instruments are not difficult to put together, and used with care give accurate results.

Plane-table work might be followed by instruction in the use of the prismatic compass, but this is admittedly more difficult in use and in comprehension, while the expense of the instrument is a serious consideration in most schools. We would merely suggest that to those few boys in the highest forms who show marked interest and ability in survey work the handling of the compass might be a subject of additional instruction.

This chapter may be concluded with some indications of the maps which are necessary for adequate teaching of school geography. Practical recommendations are limited both by the availability of suitable maps and also on the grounds of expense. Needless to say, one

or more globes are essential; economy must not begin with the globe.

To take first orographical maps, which must form the basis of geographical education since the distribution of relief is the dominant geographical factor. The world on Gall's stereographic or other projection is essential and may be supplemented by the world in hemispheres. Europe, Eurasia, North America, South America, Australasia, and Africa on easily comparable scales, when the same scale is not possible; the British Isles, England, and Scotland on larger scales are also essential. Of course, if means are available, orographical maps of parts of Europe on a larger scale, and particularly of Mediterranean lands as far east as Persia, are most desirable; the last is particularly useful in view of the importance of devoting attention to Mediterranean geography in relation to classical study and ancient history. A good orographical map of India should be included; unfortunately none of China and Japan is available.

All these maps should be coloured to show relief, and should not be overburdened with names, which are liable to distract attention from surface features. Important railways are best shown on these orographical maps. Submarine relief at least as far as the edge of the continental shelf is important as regards distribution of fisheries.

Rainfall maps for the continents and the British Isles and India are required: preferably those showing seasonal distribution rather than annual total of rainfall. The distribution of temperature is badly shown on maps for geographical purposes. Reduction to sea-level

introduces apparent simplicities which lie at the base of many of the fallacious generalizations that are the curse of school geography. Such maps must be carefully used; older pupils should be warned to what extent they are misleading. Temperature maps are required for the world, the continents, and the British Isles, and should show mean average temperatures for January and July. It cannot be too strongly emphasized that mean annual temperatures have little or no geographical value. Pressure maps, if used, should correspond.

The composite climatic map has the advantage of cheapness, but is very confusing and is not to be recommended. A somewhat neglected aspect of school maps is the vegetation map. These are now happily available and should be considered essential in school geography. A careful correlation of these with climatic maps is invaluable, and if possible the whole series should be exhibited at the same time when any particular area is being studied. This promotes the habit of thinking in maps and visualizing the area, an essential attribute of the geographer.

One other set of maps is of great value. These are the population maps. They form a fitting crown to the series and should be widely used, always with the warning that those of different continents are not strictly comparable. The population map of Europe or the British Isles very largely shows not merely the distribution of population as it is, but also the potentiality for population, provided sources of power remain constant. The map of Africa, for instance, shows merely a phase in the intensive peopling of a new continent, and except locally, where the native population

has developed the resources, or where desert conditions prevail, has little finality.

These notes on the maps necessary in teaching school geography are not intended to be exhaustive. A great deal must be left to the individual choice of the teacher and his method of presenting the subject. Politically coloured maps have their value, if confined to atlases, since no conception of natural regions is complete for geographical study that ignores political and national boundaries. But we deprecate the use of wall-maps which show merely the distribution of sovereignty and ignore the surface features. Political boundaries may quite well be added in red lines to physical maps. Luridly coloured Mercator charts of the world, exhibited in some schoolrooms, are particularly harmful to the real development of the geographical standpoint. Lastly, it might be noted that maps constructed to show the distribution of particular minerals, except perhaps coal and oil, are not of great value, inasmuch as they suggest no causal relationships. At best it cannot be said that such maps are very illuminating. Even in the case of the distribution of coal, which to a great extent explains distribution of population, it must be made clear that the maps fail to discriminate between worked and unworked deposits. The unworked deposits are of little significance in school geography.

X

SUMMARY AND CONCLUSION

In the previous chapters we have discussed various stages of the geographical argument. The purpose of the present chapter is twofold; in the first place it will seek to emphasize the necessity for the synthetic treatment of the various factors which together constitute the environment of man; and in the second place it will deal with some aspects of the influence of that environment upon man and with the response to it which is made by man.

The necessity for the synthetic treatment of geography has already been indicated more than once, but it is desirable to discuss the matter somewhat more formally. The broad study of geography must not be regarded as the study of a number of uncorrelated facts, but as the study of the relation one to another of the various factors—physical and biological—which together make up man's environment. In order to give unity to the different matters with which we have to deal we view them from a certain standpoint, namely, the influence which they exercise upon human activities and civilization. Thus the various factors in environment and the influence of each must not be regarded as isolated facts, but must be envisaged as a whole. Our first duty is to study the surface of the earth, and to obtain a correct idea of its physical features and of the place relations in which its different parts stand one to another. To understand these it is often necessary to study to some extent the various processes by which its present form

has been attained. Similarly, some reference to the physical history of the earth may be necessary to explain the distribution of soils and minerals upon which man's economic activities are so largely based. But the main duty of the geographer in his treatment of this part of his subject is to visualize the earth as the home of man in terms of its continents and oceans, its mountains and plains, its rivers and valleys, its fertile lands and its mineral deposits. Not until he has done this is he ready to proceed to the consideration of climate, a subject of great importance, since the value to man of most parts of the earth's surface is dependent upon the temperature and rainfall. In order to render intelligible his account of these climatic factors the geographer must have recourse to the laws of physics; but as the main determinants of climate are geographical, it is no less legitimate for him to do so than it is for the student of history to make use of his knowledge of Latin in reading Magna Carta.

The surface forms of the earth with the soils upon it, the minerals underneath it, and the climatic conditions which prevail over it, together form the physical side of man's environment. But with these the biological side is closely connected. Soil and climate together unite to control the distribution of the chief vegetation regions of the earth, its forests, grasslands, and deserts, and to some extent each of these regions has its own distinctive fauna.

But if the geographer has, on the one hand, to consider the environment of man as a related whole, he has, on the other, to consider the various ways in which the activities of man are stimulated, directed, or limited by that environ-

ment. In the chapter on Geography in its Economic Aspects we have discussed the influence of environment upon human action in so far as the means by which man obtains his livelihood are concerned. But man does not live by bread alone. He has other interests, religious, political, and social, and to the form which these take the geographical factor contributes its share. Nevertheless the attention which is given to the economic aspect may be justified on two grounds. In the first place, the social organization, and it may be the whole trend of the civilization of any people, are controlled to a greater or less extent by their economic conditions; in the second, it is only when his immediate necessities in regard to food, clothing, and habitation are satisfied that man turns to other subjects—to art, literature, and science. Accordingly, after we have considered the natural conditions, physical and biological, of any region we turn to the work of man in his economic aspect, in order to see how the geographical environment in which he lives influences his activities, and whether he is able to obtain from that environment a maximum or a minimum benefit. In this part of his subject, as in the study of physical environment, the geographer is on sure ground and is dealing with matters which are peculiarly his own.

We have next to consider man's interests other than those which are purely material. We know that the geographical factor has played an important part in the development of various types of civilization, but there is a question how far its study is suitable for the school curriculum. And for two reasons great caution is necessary. In the first place, it has to be noted that

apart from its economic aspect comparatively little attention has as yet been paid to the study of human geography. Sweeping generalizations have often been made, but too frequently they rest upon only a small substratum of fact. In the second place, even when it is well founded, a generalization in human geography is usually incapable of proof without reference to many specific cases. It would almost seem, therefore, that the subject ought not to be taught in school. But from such a conclusion we naturally shrink. It is precisely in the study of the relations between man and his environment that the geographer can make his own contribution to learning and justify the claims of his subject to serious consideration. Rightly considered the study of geography forms part of the training for citizenship, but it can only do so in the fullest sense if all the human aspects and not merely the economic are included. In the paragraphs which follow some indication will be given of the ways in which this may best be done. It is obvious, however, from the very nature of the case that the teaching must be incidental rather than formal, and that for its success more will depend upon the knowledge and skill of the individual teacher than upon any system of methodical instruction. Or, to put the matter in another way, the teacher will in his lessons on any particular region or type of region point out some of the more obvious influences of environment upon the civilization of the inhabitants.

As indicating the lines along which such teaching may be given, let us in the first place consider the influence of environment upon certain more elementary social groups. Take, for example, the nomadic pastoralists

who occupied, and to some extent still occupy, the steppe lands of Asia. The physical character of these regions, their climate and vegetation have been described to the pupils, they understand why agriculture cannot be followed on an extensive scale and why man is compelled, provided he can find animals capable of domestication, to devote himself to pastoral pursuits. It is easy to go farther and explain the nature of the pastoral family, drawing some of our illustrations from Biblical times and others from the records of modern travellers. The head of the family, his sons, and it may be his grandsons with their respective wives live together in a single community, which wanders about from place to place as the need of fresh pasture for their flocks and herds may direct. The head of the family is naturally its ruler, and when he dies his place is taken by one of the elders of the family group, probably a brother or a nephew of the deceased ruler because he possesses that skill in the management of stock and that knowledge of grazing-grounds and watering-places which are essential to the welfare of the steppe community. Beyond their flocks and herds the people accumulate little property, which would, indeed, be an encumbrance to them as they move from place to place. As a result there is no incentive to invention and no leisure for the arts of civilization. Each steppe family is self-sufficing and self-contained; their interests are best served by remaining apart one from another, and no large political units are developed from within. Hence the steppe peoples have no history. From year to year and from century to century they wander over their lands, engaged almost wholly in the task of the day and with

little thought of the morrow. All this may be easily comprehended by the average pupil. At the same time he ought to be cautioned against imagining that the steppe must necessarily produce this type of civilization, and this can best be done by drawing his attention to the prairies of North America, where the horse and ox which could be domesticated were replaced by the bison which could not, and where, accordingly, a hunting type of community was developed.

Or, again, consider the relations which have existed, and in many parts of the world still exist, between highland and lowland peoples. The former are hardy and vigorous because their environment will permit none else to live, their means of subsistence are obtained with difficulty, and they have considerable leisure when once their scanty crops are gathered in; the latter on the more fertile plains live an easier life, but have, as a rule, been rendered somewhat more effeminate thereby, and have in many cases become an easy prey to the rapacity of their upland neighbours. The hostility between the two has often influenced political history, as for example in ancient Babylonia, on the highland border in Scotland, and on the north-west frontier of India. Even where warfare no longer exists the lowlands retain their attraction for the highlander, and continue to draw off the excess population of the upland regions, although the process may sometimes be reversed in exceptional cases, as for example when valuable mineral deposits are discovered within the mountains.

Other illustrations will readily suggest themselves. In speaking of Poland we can draw attention to the

absence of physical frontiers to mark it off from Germany on the one hand and from Russia on the other, with the result that not only has it in the past stood in danger from these Powers, but that at all times when it has been strong it has been tempted to expand its territory at the expense of the weaker state. In speaking of irrigation we can show how the control of the water-supply has tended to increase the power of the government, whether in ancient Egypt or in modern India. In speaking of precious metals we can show how their discovery has frequently drawn off into new lands the bolder and more venturesome spirits of older countries, and has given them the elements of a strong and virile population. But enough has been said to show that even in the schoolroom there is a place for the study of the influence of terrestrial conditions upon human development, a study which is one of the main objects, if not, indeed, the main object, of the geographer.

We do not attempt to draft syllabuses for use in schools. We are not ourselves school teachers. We have written this review of the scope of geography in schools from the point of view of geographers; prescribing what we consider desirable in order to place school geography on an equal footing with other subjects whose definition has become more clearly established by practice. We deprecate too wide a scope, though to some we may seem to desire it. But we contest any tendency to narrow the limits of geography to an outlook dictated by some other particular department of study. We have attempted to formulate a coherent

school subject, and to indicate the points of contact with other subjects in the curriculum. The fact that so many such points exist demonstrates the extraordinary value of good geographical teaching, in bringing to light and directing the special interests of individual pupils.

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